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Classified Advertisements—Supp. 23.
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The Sincerest Form of Flattery

Imitation with Limitations

A CERTAIN aloofness characterises the attitude of electricity supply people towards their principal public service competitor. They judge progress, for instance, by improvements in electrical undertakings year by year, at home and abroad, and not by reference to the not very inspiring records of their rivals. Usually they shake off their tolerance only when local politics intervene to discourage development in the interests of municipal gas works or when they believe that "terminological inexactitudes" appear in propaganda designed to disturb their relations with the public.

This attitude is not an illustration of the truth of the adage that "Dog does not eat dog," since abstention from criticism is not reciprocated. It is not only in this form, however, that the gas concerns indicate interest in electrical matters. They are at least realists and do not mind taking a leaf out of the electrical book. Thus, a new publication by the Gas, Light & Coke Co., may be regarded as a reply to "Electrical Housekeeping," the quarterly of E.D.A., which has now reached its twenty-first number, except that in the latter no space can be spared for attacks on a competitor.

Saving Graces

The new gas publicity magazine is not without merit. Over and over again it gives a reminder of how much spade work has been done in the past by gas propaganda in educating the public to appreciate the importance of quality rather than cheapness of service. Such sound points as the damage done by smoke from the domestic hearth, the advantages of easily lighted smokeless fires, the value of readily available hot water, the convenience of portable appliances and the need for more points are all well presented. Many appliances are illustrated. They look very nice—almost as good as their electrical opposite numbers, which they are made to resemble as closely as possible. Almost, but not quite. "Oh, the little more, and how much it is! And the little less, and what worlds away!"

That discrepancy is apparently obvious to the compilers of the document, who having made out a case for labour-saving and convenience as against apparent cost, retrace their steps and endeavour to show, by an attack on the electrical position, why their arguments should not be carried to a logical conclusion. The spear head of the attack is the new "two-part tariff" which, justifiable enough in electricity supply (where the percentage receipts absorbed by capital charges is about five times the corresponding proportion in the case of gas) has now been adopted as a talking point for gas as a result of its popularity in its original electrical use.

From the publication under mention it is to be gathered that 20,000 householders in London are being charged on this basis. Over 100,000 more, it is said, would find it profitable, *i.e.*, no more than 5 per cent. of the total number of consumers supplied by the two largest London companies! These fortunate few can get their gas "at half price" after paying an unspecified fixed charge.

"Science" and the Facts

Next, a "scientist" explains how to compare the cost of electricity and gas in accordance with a "golden rule." The rule lays down that one therm does as much work as 20 kWh. Presumably this result has been achieved in this scientist's laboratory with skilful and meticulous adjustments of air, pressure and other details. In practice, things work out very differently. Experience shows that in cooking, for example, a therm is equal to 12 kWh.

The scientist is not communicative regarding the gas two-part tariff. In discussing its electrical counterpart he falls into the elementary error of adding together the amounts paid under the fixed and running components and dividing the sum by a meagre allowance of kWh to obtain what he calls the real cost per kWh. It is, of course, nothing of the kind. In point of fact the fixed charge added to the cost of the kWh taken for lighting only is equal to the average amount that would have been paid for lighting under a flat rate even if electricity were used for no other purpose. All electricity used for domestic purposes other than lighting is therefore paid for at the low rate and no more. This is not the case with gas, however, as even the gas companies would not (to judge from their own practice) suggest its use for lighting and the fixed charge must be added to the running charge for heating and cooking.

Actually the public is in the long run interested only in what gives the best overall results at a reasonable price. The manner in which the sales of electricity to domestic consumers (who now form 85 per cent. of the total) have gone ahead during the last few years provides appropriate proof that the public knows what is good for it.

Adequate Wiring

A CORRESPONDENT in this issue urges the need for an "adequate wiring" campaign to encourage domestic electrification, saying that such a campaign is being successfully conducted in the United States. He rather suggests that E.D.A. is behindhand in this respect, but that is not quite correct. All the campaigns waged by the Association are, in effect, campaigns for more and better wiring and it should not be forgotten that one of its special "drives" was directed particularly at securing three plug points in each room. It is true that this was several years ago now and maybe a further campaign of the same kind is about due. Nevertheless we feel that if the equipment is sold wiring must be provided, too, so that it is probably better to stress the appliance rather than the installation.

Supply and Air Attack

REGRETS expressed by Mr. J. R. Beard in his presidential address to the A.S.E.E. on Tuesday that the technical and economic features of electricity generation should be influenced by the need to protect power stations from bombers met with a sympathetic response. One example he cited is the substitution of thick window-less splinter-proof walls for the pleasing and inexpensive glass walls for turbine and boiler houses which were coming into vogue. In some ways, however, recent developments are helpful, and Mr. Beard did well to expose the fallacy that the grid has added to war risks. He showed that, on the contrary, the pooling of generating plant has provided additional effective reserves and that the interconnecting system has obviated the need for large demands for power to depend upon one power station and for the concentration of plant on a few sites. Moreover, isolated generating plant damaged or destroyed by air attack may need a long time for its replacement (especially when manufacturers are fully occupied on other defence work), whereas an overhead line hardly offers a target and can be quickly repaired. In practice, it seems likely that the greatest dislocation of electricity supply would be from chance bombs damaging cables in the streets, and the organisation of mains maintenance gangs for dealing with such cases should receive more attention than it has in many areas.

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Continued Uncertainty

MANY will have come to the conclusion that the likelihood of the Government's introducing a Bill based on last year's White Paper on the reorganisation of distribution is now remote. Until a decision is announced one way or the other, however, the uncertainty will continue to have harmful effects on development. At the present time, when the electricity output figures issued each month by the Commissioners are showing a much reduced rate of growth, it is more than ever necessary that the industry should be unhampered in its efforts to secure new business. It is therefore vital, as Sir Percival Bower said at an E.D.A. luncheon at Birmingham last week, that the Government should quickly "get off the fence."

Voluntary Co-ordination

MEANWHILE, there have recently been a number of instances in which the spirit of the McGowan Committee's intentions has been complied with by negotiation. The Bury St. Edmund's undertaking has been merged with the extensive organisation of the East Anglian Electric Supply Co. and the Shrewsbury undertaking goes to the West Midlands Joint Electricity Authority, to quote two examples. Last week also it was announced that the Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board is to take steps to acquire the Glossop undertaking, which will add to the substance of the Board, but we hope not to its title.

Trunk Road Lighting

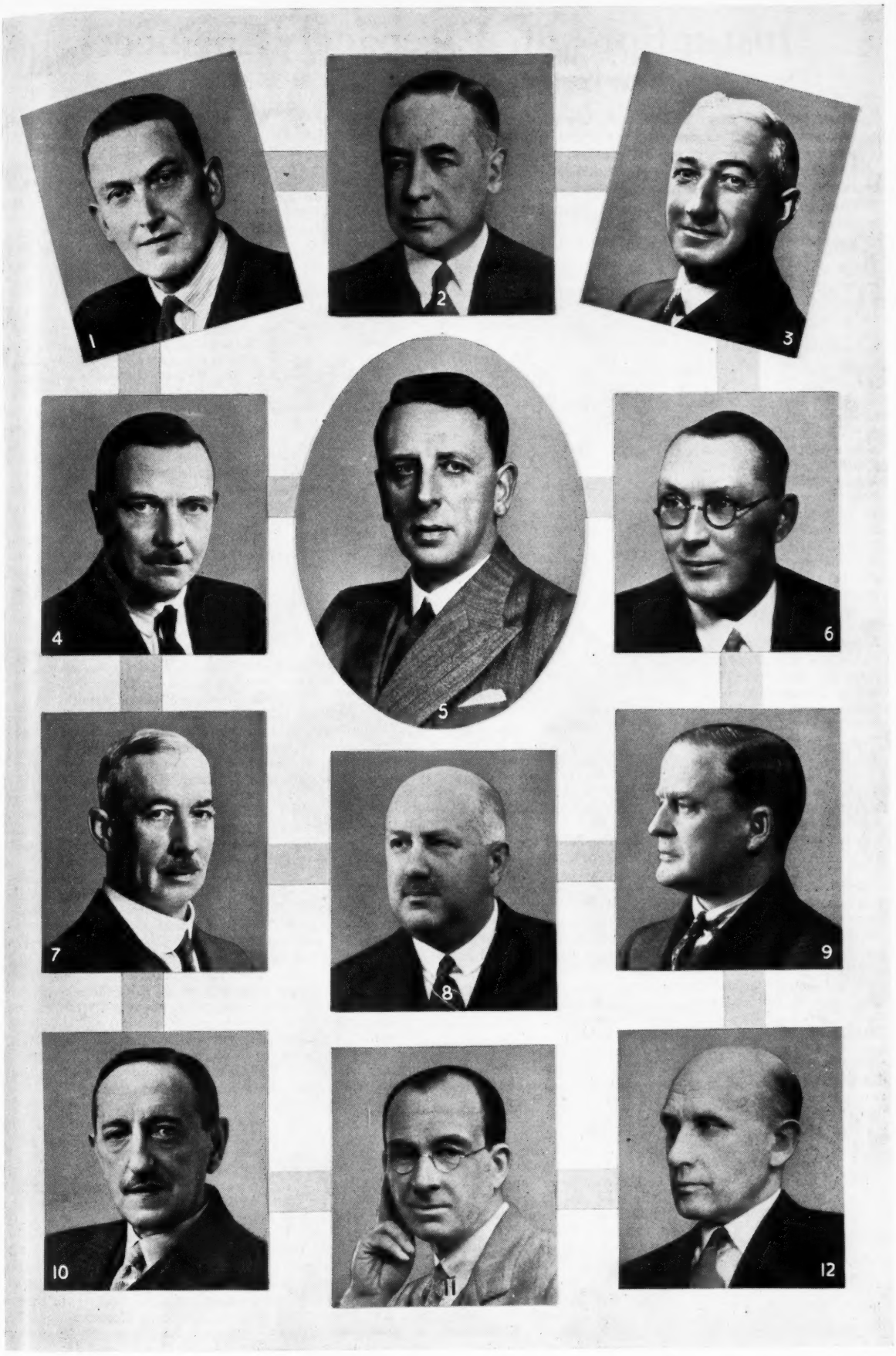
BETTER lighting means safer roads, both for pedestrian and motorist, but long sections of the trunk roads pass through the areas of comparatively small and poor villages which cannot hope to afford the money necessary for an efficient lighting scheme. The Trunk Roads Act of 1936 eased this state of affairs by giving the Ministry of Transport power to provide 50 per cent. of the capital and running costs of installations on trunk roads. Yet it was only on Monday last that the first assisted installation was inaugurated—at Earley, Berkshire. The motorist pays some 34 million pounds a year in taxes. There are 4,500 miles of trunk roads in this country and the cost of electric discharge lighting is very roughly £400 per mile per annum including capital charges on a ten-year repayment basis; it would, therefore, cost only £1,800,000 to equip them with adequate lighting.

Switchgear Testing

MANY years ago the electrical industry was urged to take steps towards the setting up of a national short-circuit testing station. One by one, chafing at the delay, leading manufacturers—Reyrolles, the G.E.C., the A.E.I. group, and the English Electric—have set up their own stations, so that now the facilities for testing circuit breakers in Great Britain are better than in any other country in which switchgear is produced and in addition very valuable experience has been gained by the manufacturers. At present there is capacity to spare after testing the products of the owners of the stations, and it will, no doubt, in effect be increased as a result of the co-ordination of their work in the Association of Short-Circuit Testing Authorities now being incorporated. The result of the original delay is to be seen in the arrangements made by the Department of Scientific and Industrial Research, reported in this issue, with the testing-station owners regarding the issue of N.P.L. certificates to other switchgear manufacturers. The latter would like to have had a Government testing station (at any rate for rupturing capacities up to 250,000 kVA) in order to enable them to meet the growing demand, from abroad as well as home, for certificated switchgear, but in view of the capacity of the plant already installed the plan proposed seems to be the best that is practicable.

A Good Record

ALREADY in nine months of this year the value of electrical equipment manufactured in this country and shipped to overseas markets has reached the total of £15,921,000, compared with £18,507,000 in the whole of last year, itself a very active period for exporters. Now, after several months of "recession," there are signs that electrical exports are being affected, but even so they still remain at a higher value than last year. The disturbed conditions in a number of foreign countries make it far from easy to conduct trade freely. The bulk of British electrical exports, however, goes to Empire countries—Australia, South Africa and India principally—where large development plans under way will need a great deal of plant and apparatus for a long time to come.



The President and Chairmen of the I.E.E. for the 1938-39 Session (See next page)

(1) Mr. A. J. Gill (Wireless Section). (2) Capt. B. S. Cohen (Meter and Instrument Section). (3) Mr. S. R. Siviour (Transmission Section). (4) Mr. J. W. O'Neill (Irish Centre). (5) Dr. A. P. M. Fleming (president). (6) Mr. H. Faulkner (South Midland Centre). (7) Mr. J. W. Atkinson (North Midland Centre). (8) Mr. E. L. Morland (Mersey & North Wales (Liverpool) Centre). (9) Mr. F. A. Orchard (North-Eastern Centre). (10) Mr. W. Fennell (North-Western Centre). (11) Mr. H. S. Ellis (Western Centre). (12) Mr. W. J. Cooper (Scottish Centre). (*Photos Nos.* 1 *and* 9, *Lafayette. Nos.* 3, 4, 5, *and* 7, *Elliott & Fry. No.* 8, *Jas. Bacon & Sons. No.* 10, *Harry Brookes. No.* 11, *Richard Hall*).

Institution of Electrical Engineers

The President and Chairmen for 1938-39

The 1938-39 session of the Institution of Electrical Engineers opened in London yesterday (Thursday), when Dr. A. P. M. Fleming delivered his presidential address; several of the provincial centres had already commenced their proceedings. We reproduce portraits and brief biographical notes of the President and Chairmen of the Centres and Sections of the Institution

THE president, **Dr. A. P. M. Fleming,** received his education at Portland House Academy, Newport, Isle of Wight, and at Finsbury Technical College, London. In 1900 he joined the Westinghouse Electric & Manufacturing Co., East Pittsburgh, U.S.A., and two years later entered the service of the Metropolitan-Vickers Electrical Co. (formerly the British Westinghouse Co.), first as insulation specialist, and later as superintendent and chief engineer of the Transformer Department. From 1916 onward he has been in charge of Research and Education, and is now director and manager of this department of the Met.-Vick Co. Dr. Fleming is also a director of B. S. & W. Whiteley, Ltd., Pool Paper Mills, Associated Insulation Products, and Micanite & Insulator Co., Ltd. He is a fellow of the Institute of Patentees and a member of the Institution of Mechanical Engineers. He also holds the honorary degrees of M.Sc. (Tech.), Manchester, and D.Eng., Liverpool. He was awarded the C.B.E. for his work on submarine detection. In the spring of this year Dr. Fleming delivered the Faraday Lecture, his subject being "The Evolution of Electric Power."

Capt. B. S. Cohen, Meter and Instrument Section, is Director of Research at the G.P.O Research Station, Dollis Hill. Educated at the City of London School and Finsbury Technical College in the days of Professors Silvanus P. Thompson and Perry, he joined the National Telephone Co., and later the G.P.O. Telecommunication Research. He has held his present position at Dollis Hill since 1929. During the War Capt. Cohen served in the R.A.F. and carried out research work on aircraft communication. He was awarded the Fahie Premium in 1907 and again in 1926 and 1928, and he is chairman of a technical commission of the Comité Consultatif International des Communications Téléphoniques à Grande Distance. He will deliver his inaugural address before the Meter and Instrument Section on November 4th, his subject being "Protective Devices used in Telecommunication." He is to deliver the Faraday Lecture on "The Long Distance Telephone Call—A Triumph of Engineering and Co-operation."

Mr. S. R. Siviour, Transmission Section, is mains construction superintendent to the Yorkshire Electric Power Co. and its associated companies. He received his early training with the Croydon Corporation and Callender's Cable & Construction Co., Ltd., and while with the latter company was engaged in construction, testing and maintenance work on many large contracts for mains, sub-station and traction equipments in the North of England and Ireland, including some of the earliest 11-kV cables and overhead lines in 1904. He joined the Y.E.P. Co. in 1911, and has occupied his present position since 1922. During this period he has been closely identified with the construction of the majority of the transmission and distribution systems of the five associated companies which now consist of nearly 4,000 miles of mains. Mr. Siviour is a past chairman of the North Midland Centre of the I.E.E. and a member of B.S.I. and E.R.A. Committees.

Mr. A. J. Gill, Wireless Section, is Assistant Engineer-in-Chief to the G.P.O. Born in Stoke-on-Trent, he served as a pupil with Alfred Yarrow & Co., Ltd., engineers and shipbuilders, Poplar and Glasgow. In 1913 he entered the G.P.O. as assistant engineer, and up to 1932 held the successive appointments of executive engineer, assistant staff engineer and staff engineer. He holds the degree of B.Sc. (Eng.), London, and is a member of the Institution of Radio Engineers.

Mr. W. Fennell, North-Western Centre, was educated at Coleshill Grammar School and the Foundation School, Whitechapel. He received his technical training at the City and Guilds Technical College, Finsbury, where he was assistant to Prof. J. Perry, and also with the Galway Electric Supply Co., Ltd. In 1895 he joined the House-to-House Electric Supply Co., subsequently becoming chief assistant consulting engineer. He took up the position of borough electrical engineer at Wednesbury in 1904, and in 1915 was appointed resident engineer of the St. Albans area of the North Metropolitan Electric Power Supply Co., where he remained until 1918, when he took up his present position of engineer and manager of the Mid-Cheshire Electricity Supply Co., Ltd. Mr. Fennell is also director of the Mersey Power Co., Ltd., and of the Mid-Cheshire Co. He was a founder and past president of the Overhead Lines Association, which was merged in the Transmission Section of the I.E.E., and is a past chairman of that Section. He was also chairman in 1937-38 of the E.D.A. North Western and North Wales Area, and has been a member of the North Western (No. 3) Whitley Councils since 1923. Since 1934 he has been a member of the North West England C.E.B. Consultative Committee. He has written numerous articles for the technical Press, and is the author of "The Grid—Its Inception and Operation."

Mr. F. A. Orchard, North-Eastern Centre, was born in Rugby, and received his education at Westminster City School. He gained civil engineering experience with the L.N.W. Railway Co., and electrical engineering experience with the Hampstead Electric Supply Co. He has been electrical designer and commercial engineer with the British Westinghouse Co., Dick, Kerr & Co., the British Thomson-Houston Co., Ltd., and Siemens Bros. Dynamo Works. From 1918-1930 he was engineer with Merz and McLellan, and from 1930-32 was with the Central Electricity Board. He is now chief assistant to the Newcastle & District Electric Lighting Co., Ltd.

Mr. E. L. Morland, Mersey and North Wales (Liverpool) Centre, was educated at Liverpool Technical Schools, and commenced his career with the Liverpool Corporation electricity supply undertaking serving under the late Mr. A. Bromley Holmes, city electrical engineer. In 1908 he was appointed assistant engineer to Mr. H. Dickinson, and in 1928 was appointed to his present position of superintendent engineer of distribution under the present city electrical engineer, Mr. P. J. Robinson. From 1928 Mr. Morland has been responsible for the design, construction and maintenance of the AC distribution system and for the change-over work.

Mr. H. Faulkner, South Midland Centre, was educated at High Pavement Secondary School and University College, Nottingham. He entered the G.P.O. in 1914 as assistant engineer, and during the war held a commission in the Royal Engineers. In 1925 he was appointed engineer in charge of Rugby Radio Station, and in 1931 became assistant staff engineer in the Radio Branch of the G.P.O. Since 1934 he has held the position of superintending engineer, G.P.O., North-West District. He is a B.Sc. (Hons.), (Eng., Lond.), and a member of the Institute of Radio Engineers. He was awarded a premium by the I.E.E. for a joint paper with the late Dr. R. V. Hansford on "Some Design Details of a High Power Radiotelegraph Transmitter Using Thermionic Valves."

Mr. H. S. Ellis, Western Centre, was born in Newcastle-on-Tyne, and was educated at St. Bees School, Cumberland. He received his technical training as a pupil with the Cardiff Corporation and at Cardiff Technical College. In 1904 he was appointed assistant engineer with the Cardiff Corporation Electricity and Tramways Departments, and three years later took up the position of chief assistant electrical engineer with the Bradford Corporation where he subsequently became deputy city electrical engineer and manager. In 1912 he was appointed borough electrical engineer of South Shields, and in 1919 went to a similar position at Southampton. In the following year, however, he set up in practice as a consulting electrical engineer (A. Ellis & Partners, Cardiff), and three years later became chief engineer and general manager of the West Gloucestershire Power Co., Ltd., which position he still holds. Mr. Ellis is a member of the Institution of Mechnical Engineers, and of the C.E.B. Consultative Technical Committee for the South-West England and South Wales area.

Mr. W. J. Cooper, Scottish Centre, received his general education in Elgin and Glasgow, at the conclusion of which he entered a law office, but remained there for only a year, becoming apprenticed to a firm of electrical engineers in Glasgow, and receiving his technical education at the Glasgow and West of Scotland Technical College. In 1907 he was appointed junior assistant by the Wishaw Electricity Department. Later he became district mains engineer with the Clyde Valley Electrical Power Co., where he remained until 1913, when he obtained an appointment with the Yorkshire Electric Power Co., as operation engineer. In 1914 he joined the Yorkshire Dragoons and was transferred to the Royal Naval Air Service, serving in Gallipoli. On his discharge he rejoined the Clyde Valley Co., and was in 1920 appointed engineer and manager of the Hamilton electricity undertaking which was then being operated by Edmundson's Electricity Corporation, for whom he also for some time managed the Hawick undertaking. On the transfer of the Hamilton undertaking to the local authority in 1926 he was appointed to his present position of burgh

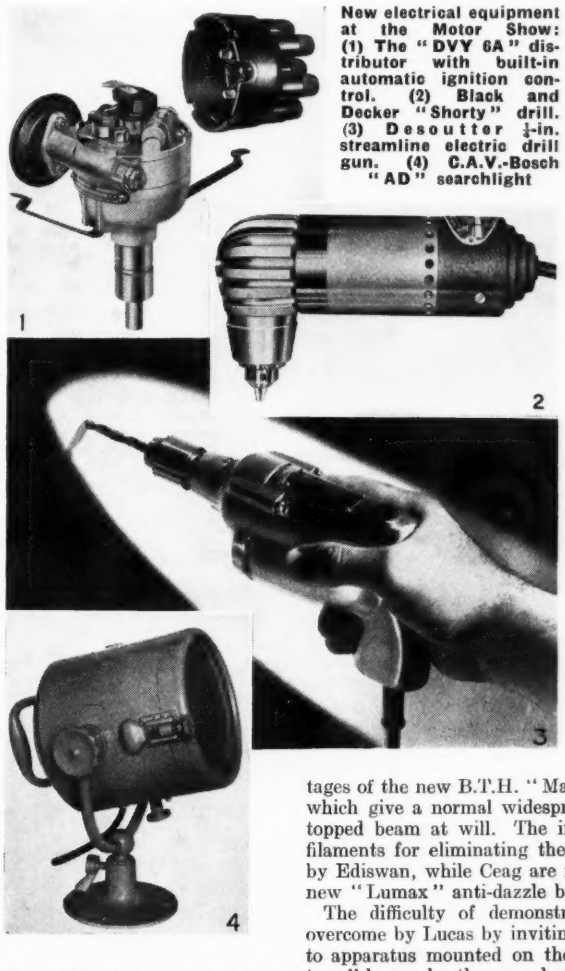
Motor-car Accessories

Equipment seen at the Motor Show

NO one visiting the thirty-second International Motor Exhibition, more familiarly known as the Motor Show, now being held at Earls Court, can fail to appreciate how much the motorist of to-day relies on electrical apparatus for safe, simple and comfortable driving. Not only is this true with regard to the equipment of the cars themselves but also of the increasing amount of electrical plant and accessories that the garage proprietor calls to his assistance.

Developments in apparatus design are perhaps most noticeable in connection with head lamps, the recent legislation regarding glare having caused most manufacturers to pay particular attention to this problem. "Matched Pairs" is a new arrangement adopted by Trippe, who are utilising two dual-beam anti-dazzle lamps with lenses adjusted in such a way that when in operation together they project a single beam nearly 1,500 ft. in range and sufficiently broad to illuminate the widest road. One lamp is adjusted to give a very wide beam in front of the car and the other to provide a long beam with more than average width. A light intensity control enables the driver instantly to adjust the volume of light for mist or fog without appreciably diminishing the area of the light pattern, the change-over being gradual.

An interesting demonstration on the Lucas stand shows how the flat-topped beam of the "Passlight" fog lamp is built up. A new version of this lamp, the "FT67," has been specially designed for large high-powered cars and it gives an exceptionally widespread beam well ahead and across the full width of the road. The well-known Lucas "P.100" head lamp has also been redesigned with a bigger reflecting surface and a new front glass giving better beam distribution. Conforming to modern tendencies its contour is, like the new Cibié lamps shown by S. Guitermann & Co., more streamlined than its predecessor.



New electrical equipment at the Motor Show: (1) The "DVY 6A" distributor with built-in automatic ignition control. (2) Black and Decker "Shorty" drill. (3) Desoutter ¼-in. streamline electric drill gun. (4) C.A.V.-Bosch "AD" searchlight

Features of both the spread and the beam-type units are combined in James Neale & Sons' "Meteor," which achieves its object without the use of a hood. A special type of split reflector has been incorporated in the Eversure non-dazzle lamps which are now available at remarkably low prices in small and medium sizes. Besides bringing out a new spotlight with a 300-ft. range, Butlers have improved their "Atlantic" pass lamp to ensure a flat-topped beam. The fan-shaped, laminated beam emitted by the Notek non-glare fog and traffic lamp is projected very close to the road surface. The use of polarised light for testing head lamp glasses is demonstrated on the Lucas stand.

In addition to car head lamps makers are showing special lamps and small searchlights for marine or army use. Butlers have a new 8-in. "Atlantic" searchlight and also a Mark II spotlight with a signalling attachment. A range of 400 yards with a 12-V bulb is provided by the low-priced type "AD" searchlight produced by C.A.V.-Bosch, who also show the ingenious type "ACS," which can be used for a high intensity beam, as a floodlight or as a signalling lamp. A new Trippe marine searchlight is available in both deck and cabin models.

A special feature has been arranged to show the advantages of the new B.T.H. "Mazda Regulation" headlight bulbs which give a normal widespread beam or a well-defined flat-topped beam at will. The importance of precision mounted filaments for eliminating the "blind area" is being stressed by Ediswan, while Ceag are making a special feature of their new "Lumax" anti-dazzle bulb.

The difficulty of demonstrating horns properly has been overcome by Lucas by inviting visitors to listen on telephones to apparatus mounted on the roof. The company's "Mellotone" horns, by the way, have been redesigned to give reduction in overall length. The "Schwartze Coil-Aire" horns shown are a new addition to the Guitermann range.

A simple adjustable speed-warning indicator makes its appearance on the Houdaille stand, while Lucas are demonstrating a solenoid operated reserve petrol valve. Easier start-

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Institution of Electrical Engineers. *(Continued from preceding page)*

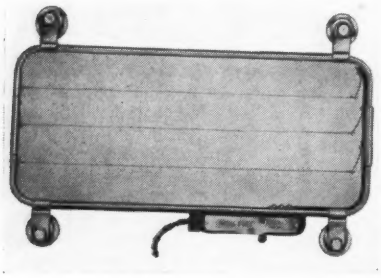
electrical engineer. Mr. Cooper was first chairman of the Scottish Area Division of the E.P.E.A. and represented Scotland in negotiations which took place preceding the Stoker Award and the preparation of the first salary schedule. He has served as chairman of the Scottish Centre of the I.M.E.A. and of the E.D.A. Scottish Area. He is at present acting as honorary secretary and treasurer to the employers' side of the Scottish District Joint Industrial Council and Joint Board, and as chairman of the Scottish Committee of the N.R.E.I.C.

Mr. J. W. Atkinson, North Midland Centre, entered the service of the Post Office as a telegraphist at Birmingham in 1893, was transferred to the Engineering Department in 1898, and proceeded to the Engineer-in-Chief's office in 1900. He was promoted sectional engineer in 1903 and acted as personal assistant to the late Mr. Martin F. Roberts until 1907. He then took charge of the Sutton and Epsom Section of the London district and in 1909 was promoted to the Bristol Section. During 1911 he was engaged on the valuation of the National Telephone Co.'s plant and in 1912 returned to the Engineer-in-Chief's office as assistant staff engineer. In 1926 he was transferred to the London Engineering District as assistant to Mr. McIlroy, and two years later was promoted to the post of superintending engineer, Leeds. He returned to the London District in 1933 as deputy superintendent engineer. When the experimental North Eastern Region of the G.P.O. was established he returned to Leeds in November, 1935, in the capacity of deputy regional director. Mr. Atkinson took a prominent part in the establishment in 1906 of the Institution of Post Office Electrical Engineers, to which he was secretary for the first two years. He was appointed a companion of the Imperial Service Order in 1937.

Mr. J. W. O'Neill, Irish Centre, is Assistant Engineer-in-Chief, Posts and Telegraphs, Eire. Born at Waterford, Ireland, he received his education in Germany and his technical training at Trinity College, Dublin. He entered the Post Office Engineering Department in 1910 as assistant engineer. Practically the whole of his service with the Post Office has been in Ireland and since the change of Government in 1922 and the establishment of a separate Post Office, he has, as staff engineer until 1937, been in charge of the underground work, and design and introduction of automatic telephone working at Dublin, which commenced in 1925, and the introduction in 1932 of open wire carrier working which has become the basic system for long-distance lines. Mr. O'Neill is a B.A. and B.A.I.Hons.(T.C.D.). The subject of his inaugural address will be "The Telephone Service in Eire."

ing is the aim of the electrically heated sparking plugs made by Cooper-Stewart. A new type of Lucas distributor has a vacuum-operated timing control and micrometer adjustment built into the body. This not only increases reliability but improves the appearance. Particular attention is being paid this year to the Delco-Remy high-voltage ignition coil specially designed for operation with wide-gap sparking plugs, while prominent among magneto exhibits are the type "J" camshaft speed magnetos for four- and six-cylinder engines interchangeable with the coil-ignition distributor head.

Regarding Diesel engines we learn that a large number are now being mounted on Silentbloc anti-vibration mountings consisting of two metal tubes with a rubber insert between. A 5-h.p. Widdop "SW" Diesel engine is seen coupled to a dynamo and water pump. A comprehensive selection of David Brown products includes their patent worm gears, profile ground spur and helical gears, and differential units.



Smith's "Royal Elite" screen heater

Battery Improvements

Improvements to batteries are largely a matter of detail. A new type of expansion joint is, for example, now incorporated in the Young super-armoured battery, the positive plates of which are totally enclosed by "Parbonite" separation. Double grease cup terminals prevent corrosion of terminal posts and leads of the Fuller accumulators, while a new type of moulded container is employed for the heavy-duty Oldham starter batteries designed for either running-board or chassis mounting. A novelty employed to draw attention to "Exide" batteries is an electric eel which demonstrates its ability to generate electricity by lighting a neon lamp.

No matter what the state of discharge of a battery the Lucas compensated voltage control equipment now fitted as standard on many makes of car ensures correct charge by automatically controlling the dynamo output. The efficiency of this arrangement has recently been further increased by a fresh development—temperature compensation, a bimetallic strip being incorporated in conjunction with a regulator adjustment spring.

The heavy demands made by the modern car on the battery make a home charging apparatus a worth-while accessory. A still cheaper model is now available from Philips Lamps, while the new Heayberd "A.0.3" charger is suitable for batteries of from 2 to 12 V and it is fitted with an ammeter. Beside the "Westric" trickle charger, Westinghouse are showing typical garage sets. The new Crypton range comprises twenty-three models and some of the latest Ediswan "Tungar" chargers are capable of charging various combinations of batteries without the necessity for balancing the separate circuits.

Warming Devices

Inside the car the most pronounced development is concerned with the utilisation of the waste heat from the engine water-cooling system for warming the passengers. A number of manufacturers, including S. Smith & Sons (Motor Accessories), who market the "Hadees" model, the A.C.-Sphinx Sparking Plug Co., R. M. Papélian, the Clayton Dewandre Co., and the Power Plant Co. ("Chevroc-McAleer"), show apparatus for this purpose, the principle involved being the provision of a subsidiary radiator provided with an electric fan for circulating the warm air.

For keeping the windscreen free from snow, frost or steam Smith's are introducing the new "Royal Elite," which incorporates a switch enabling either one, two or all three of the elements to be employed as desired. A similar defroster, the "Berkshire," is marketed by the Houdaille Hydraulic Suspension Co. Examples of electric heaters for another purpose, the warming of the engine in cold weather, are to be found in the Bertram Thomas "engine pre-heater," the new Neale "Raydyot" sump and general purpose unit and the Desmo radiator heater.

An attractive array of "Mansada" interior lamps has been arranged by Mansell and Adams, and C.A.V.-Bosch has designed a combined interior light switch and fuse unit with the object of simplifying the complicated wiring generally necessary in connecting up a bank of separate switches. A new Smith's electric clock has been standardised for the Morris Tens and the electric blind fitted to all Rolls Royce cars is made by the Piper Electric Blind Operator, Ltd., which has also just brought out an electrically operated window lift.

Radio is becoming an increasingly popular addition to a car's equipment, and various types of receiver are being exhibited by Ferranti, Masteradio, Papélian and Philips, the last-mentioned company having a specially compact model ("260B") measuring only 8¾ in. by 7 in. by 7½ in. A telescopic aerial by Desmo will fit any car and can be mounted on an attractive mascot if desired.

Garage Equipment

Photo-electric cells can now be used by garage proprietors for informing them when cars drive up, the "Photo-switch" apparatus being obtainable for the purpose from E. P. Barrus. The importance of good lighting both outside and inside the garage is emphasised by Benjamin Electric.

Fault detection is much simplified by the use of the electrical equipment now available. The new Crypton-Hartridge vertical electrical test bench is remarkably versatile and easy to operate in spite of its low price. The same function is performed by the "Octopus Electrical Laboratory" marketed by the Armature Mfg. Co., while Barrus supply the "Potter" test equipment in five units purchasable separately. A new Bendix electrically operated dynamic brake tester is suitable for testing brakes on all types of vehicles, and the Equipment & Engineering Co.'s "Magnaflux" crack detector displays considerable improvements in design.

For repair work there are several new electric tools shown for the first time. The first lightweight general purpose tool made by Desoutter Bros., the new ¼-in. "Streamline" portable drill gun, is of striking appearance and advanced design. By the clever placing of the field coils, brushes and switch it has been possible to reduce the size and weight.

A demonstration showing the advantages of the new B.T.H. "Mazda Regulation" head-lamp bulbs

Ability to work round corners is the object of the new Black & Decker "Shorty" drill, the mounting of the chuck spindle at right angles to the motor reducing the overall working length of the tool to 4½ in. Another new Black & Decker product is the "Lectro-Shear" for cutting sheet metal. The comfortable arrangement of the handles is a feature of the new portable grinder made by Wolf, who are also introducing a new high-precision valve refacer. Grimston have produced a new heavy-duty grinder with 12 in. by 1½-in. wheels for general grinding and snagging of light castings.

In their new electric welders Triangle Products claim to have the only AC equipments which heat for bending and which are capable of welding aluminium castings. Runbaken products include, besides portable welders, arc soldering equipment with variable current control and also an electrically operated water distiller. Repairs to tyres, tubes, &c., can be effected by the Steiner "Stenorizer" electric vulcanising equipment.

The exhibition closes to-morrow (Saturday).

Aircraft Production

IT is claimed for *Aircraft Production*, which is to make its first appearance on October 26th, that it will be the only journal in the world devoted solely to the technical aspects of aero engine and aircraft manufacture. Among the matter which is included in the first issue is a message from Sir Kingsley Wood, Minister for Air, and an article describing the spot welding methods employed by a pioneer German firm. The journal will appear on the fourth Wednesday of each month. It is published by Iliffe & Sons, Ltd., and the price per copy is 1s., the annual postal subscription being 16s. (Canada 13s. 6d.).

Clarence Dock

An inaugural ceremony was performed by the Minister of Transport on Tuesday last. Nos. 1 and 2 power stations on this site at Liverpool are now complete with a total main generating plant capacity of 200,000 kW.

ALTHOUGH it is now about seven years since the original 50,000 kW of generating plant at Clarence Dock was put into operation by the Liverpool Electric Supply Department, the recent completion of Clarence Dock No. 2 power station, bringing the total capacity of the whole site up to 200,000 kW, was marked this week by the official inauguration of both stations by Dr. E. L. Burgin, Minister of Transport.

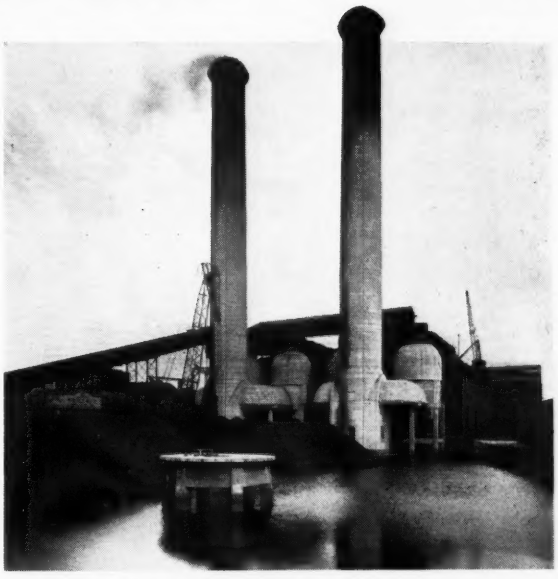
The installation is probably the only case in existence of a public supply power station group actually built in a dock, but its nearness to the River Mersey, the saving in excavation work and the natural sandstone rock foundations render the site of nearly 11 acres ideal for such a power plant system. The dock quays are 21 ft. above mean sea level and the dock bottom is 10 ft. below. The capital cost of the two power stations is £3,600,000, *i.e.*, £17.5 per kW installed or £15.8 per kW excluding the site value. The site is laid out for an ultimate installation of eight turbo-alternator sets.

The generating plant capacity of each of the stations is two 50,000-kW turbo-alternator sets. Actually all four of the sets are in one room and the two stations are differentiated by their boiler houses which have different steam conditions—450 lb. per sq. in. and 750 deg. F. in the case of No. 1 station, and 630 lb. per sq. in. and 825 deg. F. for No. 2 station. The two steam installations are interconnected *via* a pressure reducing valve. Sufficient time has not yet passed to show precisely the influence of the higher steam conditions on the installation as a whole, but the indications at the moment are that the thermal efficiency of No. 1 station of 25.4 per cent. for last year is likely to be exceeded by about 2 per cent.

The two power stations are very similar, but except for specific references to No. 1 station the following description refers particularly to No. 2 station. Slack coal with a calorific value of about 11,600 B.th.u. per lb. is consumed and is both rail and sea borne. But all the coal is brought to the stations in 360 twenty-ton steel hopper wagons owned by the undertaking. It is discharged by gravity from the wagons into a 5,000-ton concrete coal silo from which it is taken by two rubber belt conveyors to the bunkers at the top of the boiler house. The conveyors have a capacity of 220 tons per hour each.

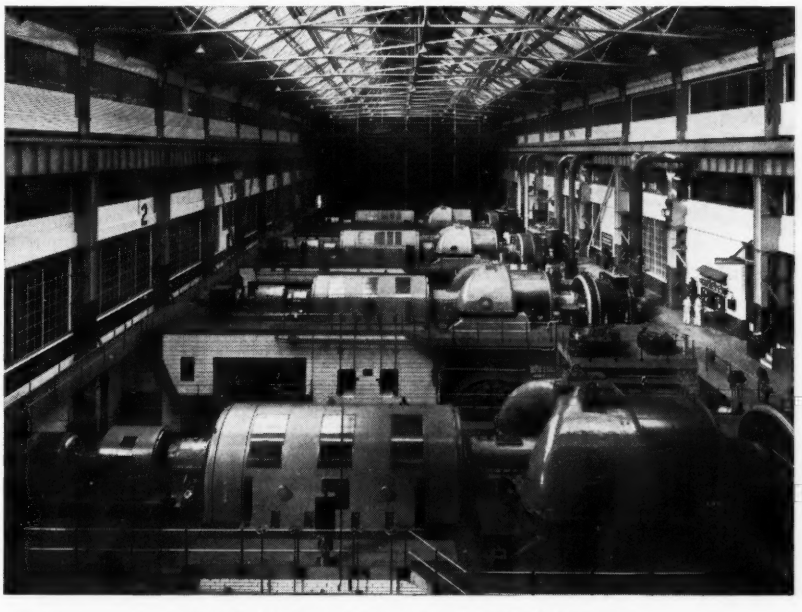
Separated from the station by a large concrete retaining wall, about 2½ acres of the original dock provides storage for about 60,000 tons of coal. This is stacked to a depth of over 30 ft. and the storage area is kept flooded with sea water to a depth of from 20 ft. to 25 ft. as a precaution against spontaneous combustion. For handling the coal to and from this storage area there are two 100 tons-per-hour jib cranes each equipped with a four-ton grab and having a working radius of 100 ft. The cranes are mounted on concrete pedestals above water level and a spare pedestal is ready to receive a third crane when this is required.

There are at present six 200,000-lb. per hour boilers, and there is provision for a seventh equipment which will render the complete lay-out comparable with No. 1 boiler house with its 160,000-lb. per hour and 200,000-lb. per hour units. All the boilers have Bailey water-cooled walls and are fitted with chain-grate stokers. Each boiler is virtually in two sections, so that the forced-draught, induced-draught, and secondary-air fans are all in duplicate. The induced draught fans are on the roof and the forced-draught fans are above the boilers but under the roof. The fans are all motor driven through hydraulic couplings, the oil pressures of which are electrically controlled from the firing floor so that there is no air regulation by the dampers, but only by fan speed with consequent saving in power.



The new station showing concrete chimneys, downcast grit-arresting chambers, storage area and cranes. The "island" in the foreground is a pedestal for a third crane

Before the air from one of the forced-draught fans is delivered to the furnace it is passed through heaters for an exchange of heat from the hot gases which serve the heaters after they leave the economiser, so that the complete air path is: forced-draught fan, air heaters, boiler, economiser, air heaters, grit arrestors, i.d. fan, downcast chamber, chimney. A recovery of 12 per cent. is achieved by the air heaters.



The turbine room containing four 50,000-kW sets

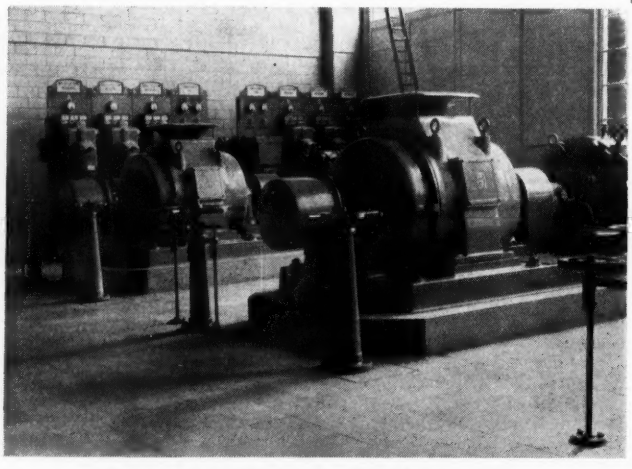
From the steel flues on the roof the hot gases pass into the large concrete downcast grit-collecting chamber in which their velocity is suddenly reduced owing to the large increase in the diameter of the transmission channel from 20-ft. diameter to 35-ft. diameter, with the result that most of the soot or grit which may still be in the gases is deposited in the hopper bottom of the grit chamber, while the slow moving gases pass out at the side of the chamber into one of the two concrete chimneys.

These chimneys are believed to be the largest, though not quite the highest, in the world, and although each is 335 ft. high and has maximum and minimum diameters of 28 ft. and 25 ft., respectively, and weighs about 4,400 tons, the rock foundation is so good that the excavation for the footing is only 80 in. deep. The chimneys are constructed of reinforced concrete and have a special brick lining. At the point of gas entry the thickness of the concrete is 11 in., narrowing to 6 in. at the chimney top.

Centralised hand control is arranged for each boiler and we were impressed by the specially designed control boards on the firing floor. The large vertical panel carrying the instru-

ments and the desk-top panel at the bottom fitted with lever-type handles for operating the fan hydraulic couplings are deeply recessed within a frame from the back of which light is projected on to the panels. All the main boiler valves are electrically operated for emergency purposes.

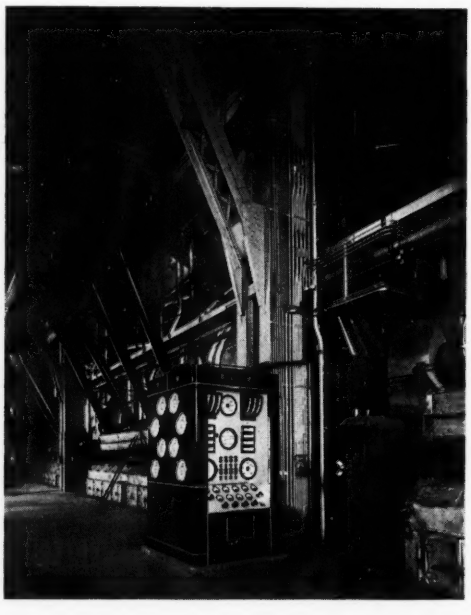
The boilers are equipped with paddle ash equipment and the quenched ashes from the tubs under the chutes in the ash basement are belt conveyed for discharge into the same flooded pit into which the ashes from the boilers of No. 1 power station are discharged by scraper chain equipment. The ashes are removed from the pit by two 2½-ton grab cranes and are discharged into a 1,000-ton hopper-bottomed silo under which motor lorries or railway wagons are loaded.



Two of the electrically driven feed-water pumps

Whereas the feed-water pressure in No. 1 station is raised in two stages, in between which the water is heated by bled steam from the turbine, in No. 2 station the feed water is raised to its ultimate pressure in one stage and in this case there are high-pressure feed heaters on the turbine. There are three electrically driven and a stand-by feed pump (525,000 lb. per hour at 795 lb. per sq. in.) and fluctuations in the feed water demand are compensated by five surge tanks which are kept under vacuum so as to act as de-aerators. The feed-water cycle is thus boiler, turbine, condenser, extraction pump, surge tank, feed pump, bled steam heaters, boilers. The surge tanks are actually Lancashire boiler shells from the older Lister Drive power station and, together with the steam receivers and the works sub-stations, they are housed in the power station annexe. Make-up water is supplied from the town's mains *via* the turbine evaporators and the final feed-water temperature at the economiser inlet is 358 deg. F.

Each turbo-alternator set has a high-pressure turbine, a low-pressure turbine, a main alternator, a 1,500-kW auxiliary alternator and an exciter, together with the condensers and circulating-water plant. The stop-valve steam conditions are: 600 lb. per sq. in. and 800 deg. F. Circulating water is pumped from the River Mersey through two large concrete ducts, and since the circulating-water pumps are on the bottom of the dock there is a positive head of water on the suction side at practically all tides. The circulating water is discharged through two similar concrete ducts to a point higher up the river. The alternators generate at 33 kV direct, thus dispensing with the step-up "tied" transformers used in No. 1 power house. A 110-ton travelling crane has a 105-ft. span across the turbine house.



Part of the 200,000-lb. per hr. boiler plant, including one of the control boards

The ground floor of the switch-house is equipped with the main oil circuit-breakers for control of the generators and feeders supplying the works auxiliaries, several main sub-stations in the area of supply, the grid step-up sub-station and the Central Electricity Board's Wirral area *via* Birkenhead. The cables and connections from these switches are taken into a cable tunnel below the switch floor; they run the full length of the switch house and extend eastwards under Regent Road, where they radiate in various directions. Above the switch room is the bus-bar room, where the bars are sectionalised to permit the division and transfer of load, and the next floor contains reactor equipment for fault surge limitation. The reactors are coupled through the reactor tie-bars on the top floor, where the operating battery is also accommodated. There are forty-two 33-kV circuit-breakers with a rupturing capacity of 1,500,000 kVA.

The control room houses the panels for the remote control of the generator, feeder and works auxiliary sub-station switches, a C.E.B. equipment for indicating the switching arrangements at the grid sub-station and frequency control apparatus. A map diagram on the north wall of the control room shows the trunk feeders between Clarence Dock, Lister Drive and the main sub-station.

All the original small generating stations at Liverpool are now out of commission and generation is carried out solely at two cooling-tower stations at Lister Drive and Clarence Dock. The existing Nos. 1 and 3 Lister Drive power stations have generating-plant capacities of 22,000 kW and 50,000 kW, respectively. The following are the performance figures for last year for No. 1 Clarence Dock station: kWh sent out, 632,183,100; coal consumed per kWh sent out, 1.180 lb.; thermal efficiency, 25.4 per cent.; works cost per kWh sent out, 0.14d. During the same year 828,332,380 kWh was generated at all the power stations of the undertaking and 299,077,000 kWh was exported to the grid. The remaining output was distributed as follows:—Liverpool Corporation passenger transport 65,795,000 kWh; street lighting 7,752,000 kWh; railway and harbour undertakings 31,462,000 kWh; lighting, heating and cooking 200,356,500 kWh; and power and general purposes 167,892,000 kWh. The appliances which are enumerated below are on hire from the undertaking and are additional to privately owned apparatus: 30,000 cookers, 45,000 wash-boilers, 3,000 fires and 6,000 water heaters. The total number of consumers connected to the undertaking's mains is now 180,000.

The whole of the work was carried out under the direct supervision of Mr. P. J. Robinson, M.Eng., M.I.E.E., city electrical engineer, who also served as consulting engineer in collaboration with Messrs. L. G. Mouchel and Partners, Ltd., civil engineering consultants, and Professor C. O. Bannister, M.Eng., consulting metallurgist.

Among the principal contractors were the following:—F. Morton & Co., Ltd., structural steelwork; Wm. Moss & Sons, Ltd., civil and building works; J. Henshaw & Sons, chimneys, grit chambers and crane pedestals; Hadfields, Ltd., railway sidings; S. Denison & Son, Ltd., weighbridge; the Cement-Gun Co. (Great Britain), Ltd., and the Francois Cementation Co., Ltd., coal-bunker linings; Babcock & Wilcox, Ltd., boilers and coal cranes; Metropolitan-Vickers Electrical Co., Ltd., turbo-alternators; Stewarts & Lloyds, Ltd., and John Spencer, Ltd., steam and feed pipes; British Thomson-Houston Co., Ltd., main switchgear; Mather & Platt, Ltd., feed pumps; Richardsons, Westgarth-Brown, Boveri, Ltd., turbo-feed pump; Henry Simon, Ltd., and Spencer (Melksham), Ltd., coal-handling plant; Metropolitan-Cammell Carriage & Wagon Co., Ltd., coal wagons; Robert Dempster & Sons, Ltd., ash cranes; Sir Wm. Arrol & Co., Ltd., turbine house crane; Herbert Morris, Ltd., and Austin Lifts, Ltd., lifts; Daniel Adamson & Co., Ltd., and Allen & MacLellan, Ltd., air compressors; Hugh Douglas, steel flues; Wallace & Tiernan, Ltd., chlorination plant; Fawcett, Preston & Co., Ltd., and East Ferry Road Engineering Works Co., Ltd., hydraulic sluice gates; W. & T. Avery, Ltd., coal weighers; J. Blakeborough & Sons, Ltd., valves; Brookhirst Switchgear, Ltd., George Ellison, Ltd., and Crompton Parkinson, Ltd., switchgear; Budenberg Gauge Co., Ltd., George Kent, Ltd., Electroflo Meters Co., Ltd., Negretti & Zambra and Cambridge Instrument Co., Ltd., instruments; Davidson & Co., Ltd., fans and grit arrestors; Dewrance & Co., boiler mountings; Ferranti, Ltd., transformers; Glenfield & Kennedy, Ltd., valves; James Gordon & Co., Ltd., boiler mountings; E. Green & Son, Ltd., economisers; Hick, Hargreaves & Co., Ltd., rotary strainers; Hopkinsons, Ltd., boiler mountings; Hydraulic Coupling & Engineering Co., Ltd., hydraulic couplings; C. P. Parry, Ltd., soot-blowers.

We are indebted to Mr. Robinson for permission to visit the

Clarence Dock power stations prior to the opening ceremony and to take photographs, and to Mr. H. Pryce-Jones, M.Eng., M.I.E.E., deputy city electrical engineer, and Mr. T. Coates, chief technical assistant, for their help in collecting the above information.

On the inauguration day, Tuesday, the Minister of Transport was a busy man, for after flying to Liverpool he made three speeches—one at the opening ceremony at the power station and two subsequently at the celebration luncheon at the Adelphi Hotel—and performed, as he put it, two acts of faith in unveiling commemorative tablets at the power station and starting up the fourth turbo-alternator, in each case by the touch of a button.

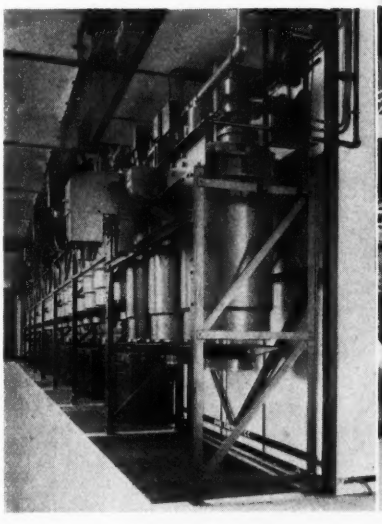
Dr. Burgin pointed to the striking contrast between the apprehensions of destruction behind the recent European crisis and the service to man represented by the Clarence Dock power stations. That about only a fortnight after the crisis there could be such an illustration of the great contribution to mankind of the medium of light, warmth, service and healing must have been a measure of comfort to those who had planned the great work necessary to bring about such an achievement as this.

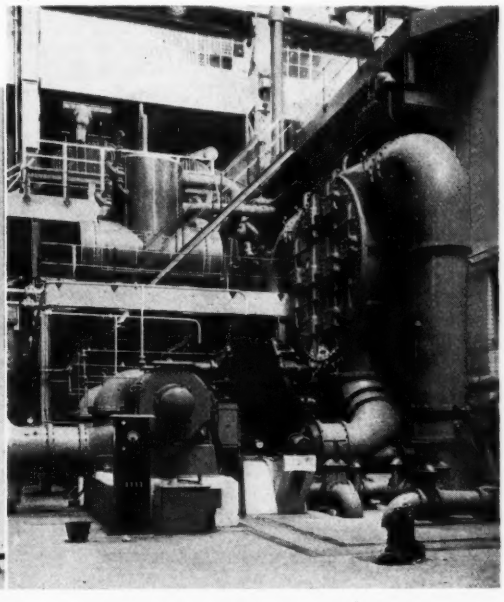
His impression of the installation was that it combined simplicity and greatness. In paying tributes to Alderman Frank C. Wilson, J.P., chairman, Clarence Dock Power Station (Special) Committee and Mr. Robinson, Dr. Burgin said that the Clarence Dock site was not acquired by accident and someone had had to pursue the work with great driving force.

Alderman Wilson said that the reasonable capital cost of the Clarence Dock power stations combined with the high operating efficiency might result in the lowest kWh cost in this country. Councillor A. Critchley, M.P., said he looked upon Clarence Dock as a model of municipal enterprise.

Sir Cyril Hurcomb, K.B.E., chairman of the Electricity Commission, said that at 55 years of age the Liverpool undertaking showed no signs of a limit to its growth, and the completion of the No. 2 power station was a proof of vitality rather than of finality. Not all undertakings had shown a willingness to adjust their boundaries to requirements, but Liverpool had constantly extended its area.

Left: Section of 33-kV, 1,500,000-kVA rupturing capacity, switchgear. Right: Condenser basement showing evaporator for No. 4 turbine





An All-electric Cornish Farm

AT Legonna Farm, St. Columb Minor, Cornwall, where the stock includes 250 sheep, 200 pigs, and a herd of cows supplying 40 gallons of milk per day, there is now one of the most complete electrical installations of its kind in the country. Farmhouse, barn, cowshed and dairy are all equipped with the Callender wiring system, with two-way switching and remote control wherever possible, the cable being taped and braided v.i.r. drawn into screwed conduit. Protected iron-clad switchgear is used in all outbuildings. The farmhouse equipment includes a cooker, dish washer, 7.5-kW refrigerator, four 3-kW fires, electric cleaner, irons, kettles, water heaters, radio set and a cinematograph projector outfit. All water is electrically pumped.

The all-electric farm at St. Columb Minor, Cornwall, showing (below) a sheep being shorn by means of electric clippers and (below right) the sterilising room in the dairy

Equipment in the dairy includes an electric milk urn steriliser (6 kW), suction milking plant with a 2-h.p. motor, two sets of water heaters and a 1-h.p. motor for water pumping. In the big barn is a 7½-h.p. motor for operating crushing machinery, an 18-in. fan used in conjunction with an air duct for extracting dust while crushing is in progress, and an electric incubator. Sheep are electrically sheared, while electric soldering and drilling are done in the farm workshops. The lighting installation comprises fifty-five points, and includes the illumination of a fishpond. Work previously done with horses is now carried out with two tractors and a trailer. A large waterwheel is still used for providing power for the barn machinery when there is sufficient water, and failing that there is an electric motor with a drive so arranged that it can operate the countershafts at a similar speed without any adjustment other than an exchange of belts.

The necessary electricity is obtained, at a special rate applicable to farmhouses and buildings, from a tapping of the Cornwall Electric Power Co.'s 11-kV overhead line stepped down by an adjacent pole-mounted transformer to 400/230 V. Mr. J. Roberts, the owner, is most enthusiastic about the advantages of electricity, and he is now considering the installation of further equipment, including another water heater and syrens for bird scaring. The installation was designed and carried out by the Newquay branch of the Cornwall Electric Power Co.

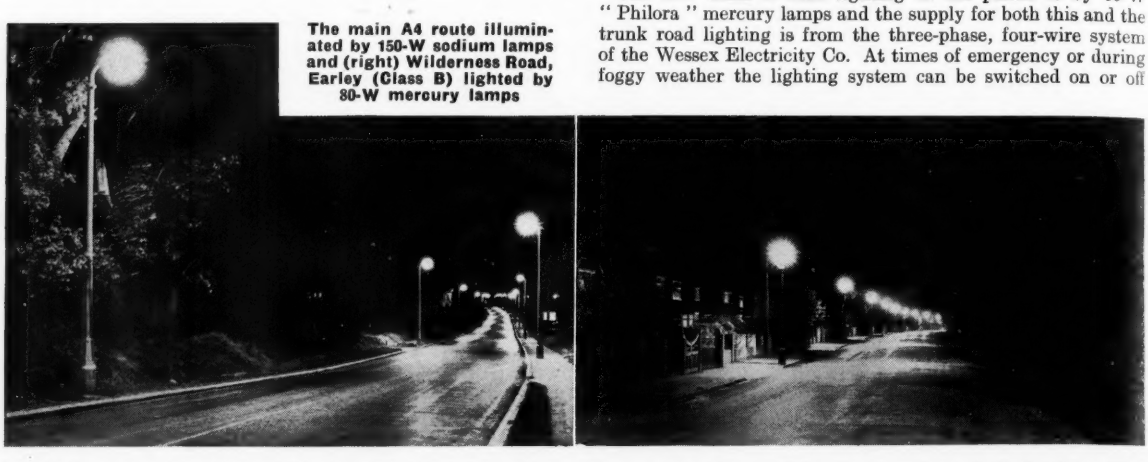
Trunk Road Lighting

First scheme to receive an M.O.T. grant

IN 1936 the Ministry of Transport became empowered to issue grants of up to 50 per cent. to local authorities for the lighting of trunk roads. On Monday last a large party met at Earley, on the Maidenhead-Reading road, to witness the inauguration of the first trunk road lighting scheme to receive a grant from the Ministry. The trunk road installation is part of a general lighting scheme by the Earley Parish Council and includes eighty-two 100-W tungsten filament lamps, and seventeen 250-W mercury vapour lamps, ninety-eight 80-W mercury lamps and thirty-six 150-W sodium vapour lamps. The A4 trunk road sodium lighting is arranged in conformity with the Final Report of the Departmental Committee of the Ministry of Transport, the layout being planned by Engineering and Lighting Equipment, Ltd., who also supplied the "Golden Ray" fittings. These fittings use a special design of prismatic plate having both vertical and horizontal prisms to control the light from the Philips "Philora" sodium lamps. The electrical control gear is housed in the base of each standard, the spacing being 120 ft. A mounting height of 25 ft. is obtained by concrete poles made by Concrete Utilities and the brackets project 2 ft. 6 in.

The new Class B road lighting in the parish is by 80-W "Philora" mercury lamps and the supply for both this and the trunk road lighting is from the three-phase, four-wire system of the Wessex Electricity Co. At times of emergency or during foggy weather the lighting system can be switched on or off from a central control by the use of a polarised relay. The Wessex Co.'s three transformer sub-stations are interconnected with the Sonning Cutting sub-station where the central control is situated, by means of telephone wires, the system being devised by Standard Telephones & Cables, Ltd.

The installation was inaugurated by Captain Austin Hudson, M.P., Parliamentary Secretary to the Ministry of Transport.



The main A4 route illuminated by 150-W sodium lamps and (right) Wilderness Road, Earley (Class B) lighted by 80-W mercury lamps

Switchgear Testing Arrangements

THE Department of Scientific and Industrial Research has completed arrangements with owners of short-circuit testing stations for testing certain ranges of switchgear under conditions which will permit the issue of National Physical Laboratory certificates. Replies to a questionnaire disclosed a considerable measure of agreement that it was desirable to provide facilities for manufacturers who did not possess testing stations and that an independent body should issue certificates. At the same time, those companies which had already erected short-circuit testing stations for their own use submitted that they would have spare capacity available and offered to collaborate with the Department to provide facilities for testing for any British manufacturer. After consultation with the firms which had appealed for a Government testing station agreement was reached on a scheme which permits the existing testing stations to continue to issue their own certificates of rating and records of performance and, in addition, provides facilities for the issue of N.P.L. certificates. The main features of the scheme are as follows:—

(i) The owners of testing stations included in the scheme will provide facilities for testing switchgear for any British manufacturer, and will undertake that the full-time use of one test bay will be made available collectively for manufacturers who do not themselves own testing stations.

(ii) Tests will normally be carried out to the requirements of B.S.S. No. 116, Part I, 1937, and will in the first instance be limited to the ratings covered by that specification, subject to a maximum voltage of 11,000 and a maximum rating of 250,000 kVA. Voltages lower than 3,300 will be considered as soon as the appropriate B.S.S. are available. Performance tests at non-standard voltages and capacities within these limits may be undertaken by agreement.

(iii) While the Association of Short-circuit Testing Authorities will issue its own certificates of rating and records of performance, N.P.L. certificates will be obtainable for switchgear from the Director of the National Physical Laboratory, who will decide in consultation with the owners at which station any individual test shall be made. To avoid difficulties over priority in testing for different manufacturers, no N.P.L. certificates will be issued for an initial period. Certificates in respect of tests undertaken during this period will be released simultaneously at the end, but reports on tests will not be delayed.

(iv) Strict confidence will be observed in connection with the design of circuit-breakers submitted for test and the results of tests.

Arrangements with the owners of the stations include provision for inspection of each station by the National Physical Laboratory, including testing and certification of its instruments, in order that the Laboratory may be satisfied that the plant and equipment, organisation and staffing arrangements are suitable. There will also be a resident officer of the Laboratory at each station. The Department will be represented on the committee of the Association of Short-circuit Testing Authorities, which will determine the technical procedure to be adopted in testing and also on the committee which considers the charges to be made for tests. The Department will appoint an advisory committee which will include nominees of the owners of the stations and of firms which do not own stations, as well as independent members selected by the Department. The stations at present included in the scheme are those of the English Electric Co., Ltd., the General Electric Co., Ltd., the Switchgear Testing Co., Ltd. (owned jointly by the British Thomson-Houston Co., Ltd., Ferguson, Pailin, Ltd., and the Metropolitan-Vickers Electrical Co., Ltd.) and the British Short-Circuit Testing Station, Ltd. (owned by A. Reyrolle & Co., Ltd.).

A further announcement will be made, giving fuller details of the tests and of the charges arranged, as soon as the National Physical Laboratory is ready to receive orders for testing.

The "Exide" Luncheon

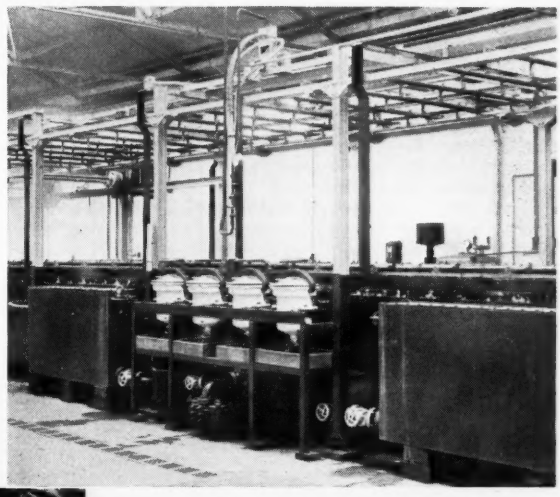
As we report on another page, the Motor Show at Earls Court opened on October 13th, and in accordance with custom the Chloride Electrical Storage Co., Ltd., held its annual luncheon on that day at the Clarendon Restaurant, Hammersmith. A novelty this year was a series of "demonstrations" by "Exide," an electric eel whose resentment at being disturbed was recorded by an oscilloscope. Mr. D. P. Dunne, managing director of the company, presided as usual and amused the company with one of his rather inconsequential dissertations. He mentioned in connection with the recent war scare that there was a run on the company's electric torches, and he also made reference to the value of the "Keepalite" system in emergencies, slyly suggesting that one day the grid might be abandoned in favour of independent power stations, which would be all to the advantage of the battery industry.

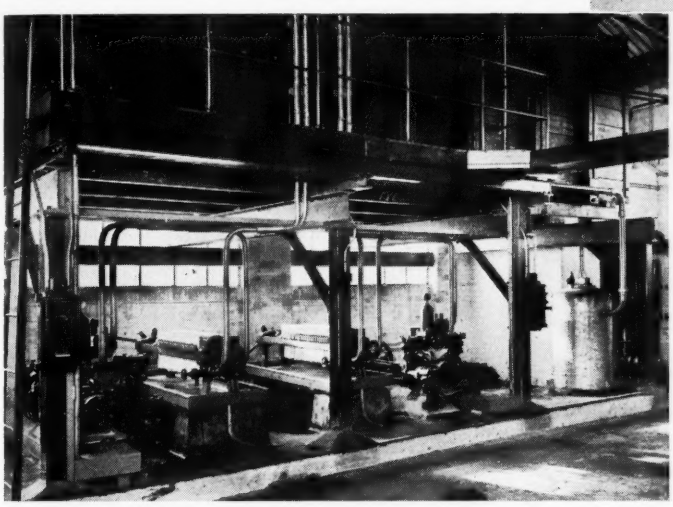
Control of Plating Solutions

Methods of filtration, agitation, heating and testing

METHODS of mass production in electro-deposition embracing automatic plants have made control of plating solutions more necessary than ever. Anything less than complete control nullifies to a great extent speeding-up methods.

It is desirable to filter most plating solutions from time to time in order to free them from an accumulation of sludge in the bottom of the vat caused by minute particles of dirt and grit which have been held in suspension for varying degrees of time. The most minute particle is liable to be carried along with the metal being deposited and form an occluded pin-





Above: External filter-pot method of filtration and heating apparatus as applied to an automatic nickel-plating plant. Left: Complete filtration apparatus for automatic nickel-plating plant; twin sets of filter presses and pumps with storage vats overhead

point irregularity on the article which is magnified as the plating proceeds. Moreover, such a speck of foreign matter would not stand alone, and a solution permeated with them could never produce a perfect plating job.

Agitation is of great value because it maintains a uniform condition of the solution throughout the plating bath. In a still solution the electric current tends to concentrate on prominent parts of the articles. Uniform plating and avoidance of "burning" are most certain, as the solution is kept uniform in concentration in contact with the cathode.

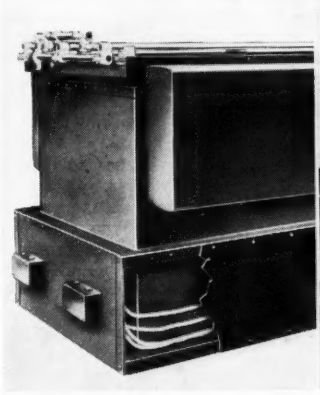
Continuous filtration is necessary with agitated solutions—particularly that used for warm nickel plating—as agitation keeps the particles of foreign matter in suspension. This applies particularly to automatic plating plants. Agitation is also necessary to prevent a strata of metal-exhausted solution gathering around the work. Such a condition would favour the formation of hydrogen bubbles on the cathode surface with consequent pitted or porous deposits. The one exception in the need for filtration is in chromium plating, because the deposit is only 0.00002 in. thick, and the solution is never agitated.

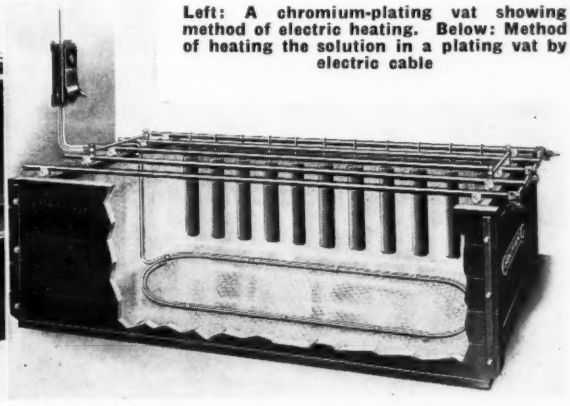
Apparatus for agitating and filtering solutions are now combined in newly constructed vats, but the principle employed is the same in the case of the addition of a filter to an existing plating plant with an air supply. The filter unit of a modern installation consists of vitreous enamelled containers (filter pots) which carry seven or ten filter "candles" made of a porous material. This material, called kieselguhr, has been found the finest medium for filtering plating solutions, as it not only separates the coarsely suspended matter, but also removes ferric hydroxide and black nickelic oxide. Moreover, it stands up to its work much longer than filter bags, and the thickness of metal deposit can be reduced and output increased without loss of quality in the plated product—indeed the finish gives a smoother plate and subsequent "finishing" operations can be curtailed. The candles are mounted on a plate or grid which can be easily withdrawn bodily for cleaning the candles. An air-circulating pump and a motor-driven air valve are employed, the former being acid proof, non-metallic and entirely valve-operated without any other moving parts.

When this installation is not called for, a self-contained motor-driven portable unit is used. The filter pots, motor and pump, suction and delivery hose are mounted on a trolley for placing alongside the vat which is to be dealt with. This unit is used in conjunction with a storage vat for the solution withdrawn from the plating vat with capacity equal to the total volume of solution used in the plant. The storage vat is mounted on a raised platform so that the solution runs back into it by gravity. If this arrangement is not possible the solution must be pumped back through the filter to ensure absolute cleanliness. A mobile outfit can be used for continuous filtration by placing the suction hose at the bottom of the vat at one end and introducing the delivery hose at the other end.

An efficient method of filtering warm nickel-plating solutions in the average-sized plant is that which combines agitation, filtration and heating. A cone type of filtering unit is mounted at opposite corners of the plating vat and agitation is effected by a rotary air pump drawing air from a container and discharging it from jets through coils placed in the bottom of the vat. The heating coils are placed alongside. The cone is made of lead and contains a removable filtering bag.

Left: A chromium-plating vat showing method of electric heating. Below: Method of heating the solution in a plating vat by electric cable



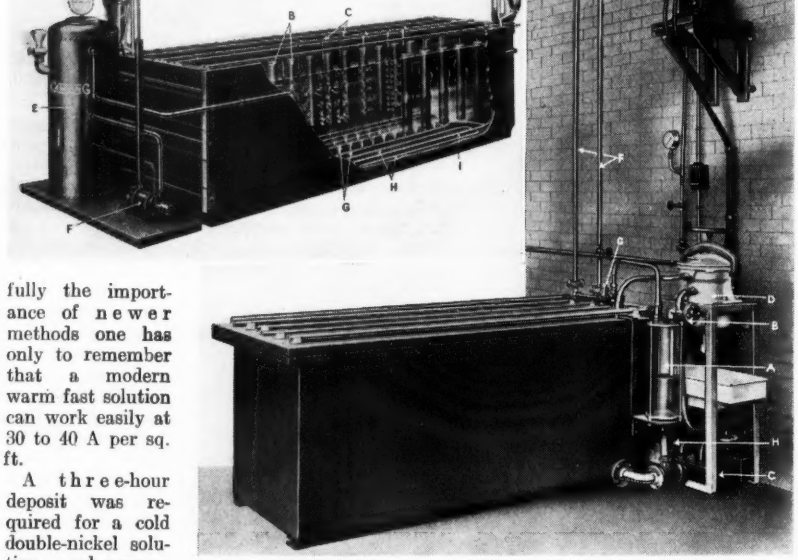


For automatic plating plants, the apparatus necessary for filtering solutions running into some thousands of gallons per vat takes on a more pretentious aspect. Two methods are

employed, the first using filter pots with kieselguhr candles and the second special filter presses. Motor-driven pumps of solid nickel and storage tanks are employed in both examples, and the arrangements provide for continuous automatic filtration and for the complete weekly emptying of the solution vat for thorough cleaning. The second principle has been adopted also for other large plating plants where floor space is restricted by combining the press and motor-driven pump in a vertical self-contained unit.

A heated plating solution offers great advantage over a "still" solution. The current density may be greatly increased without danger of "burning" the articles being plated, and thicker deposits may be obtained in far less time. Heavy nickel deposits of remarkable adhesion and texture can be obtained in less time and with less trouble than was necessary for the scant coating of the older methods. A coating of nickel 0.0002 in. thick was once regarded as satisfactory, and thicknesses of 0.00005 in. were quite common. Such thin deposits must, by the very nature of things, be porous; and since nickel affords no electro-chemical protection for iron, they are totally unsuitable for modern requirements. With the old cold double-nickel solution a current density of 3 A per sq. ft. could never be exceeded, producing a coating of approximately 0.00015 in. of nickel in an hour. To realise fully the importance of newer methods one has only to remember that a modern warm fast solution can work easily at 30 to 40 A per sq. ft.

A three-hour deposit was required for a cold double-nickel solution, whereas forty minutes is considered sufficient in a warm solution.



Top: Cone type filter fitted to warm nickel-plating vat. The view shows the filter coils and their relation to the coils for agitating and heating the solution

A, insulated coupling. B, depolarised anodes. C, cathode suspenders. D, cone filter. E, air container. F, rotary pump. G, agitating coils. H, heating. I, filter coil

Bottom: External solution filtration and heating apparatus for nickel plating

A, air washer. B, inlet from air supply. C, all-ebonite pump for circulating solution through filter. D, filter unit. E, motor-driven air valve. F, steam pipes. G, air valve to agitating pipes. H, heating tank

Electric heating has made great headway of recent years. The most common form is a cable laid on the floor of the vat which gives high efficiency because of the entire absence of condensation and because heat is transmitted direct to the solution. The coil occupies no working space and can be arranged in any position. The covering of the cable is of chemically pure lead to withstand the action of the solution. Exclusion of all free oxygen ensures that the insulation cannot scorch or the element wire scale. The heating element terminates in a lead-covered supply cable, which is lead burnt to the element so that the whole heater, with its feeding wires, is electrically and mechanically one.

The electric coil heater is suitable for warm nickel plating, acid copper, zinc plating, and all acid plating solutions. It should not be used for cleaning or for cyanide and alkaline plating solutions, and it should not be placed in a chromium bath. For chromium solutions electric ring units are used. These are fixed to the outside of the vat and enclosed in a jacketed tank.

Cyanide and alkaline solutions, including those used for cleaning, are heated electrically by an immersion heater. The heater is contained in a plain iron tubular case (lead-covered when necessary) or tinned copper case, and is fitted with an earthing terminal so that a three-core cable can be used for wiring, one line being connected permanently to earth. The heater itself may be secured horizontally in the bottom of the vat, or it may be suspended from the inner side.

Correct acidity of nickel solutions has an important bearing on the quality of the deposit. Very slight variations in acidity materially affect the nature of the nickel deposit, causing lack of adhesion, brittleness and pitting. Nickel solutions should be tested daily for both density and acidity. The density is really a measure of the metallic concentration, but it is no guide to metallic content in a cyanide solution owing to the accumulation of carbonates in alkaline liquids.

An accurate measurement is obtained of the degree of acidity in a nickel solution by the use of an instrument called a nickel comparator. The results are read within specified ranges in terms of *p*H values from 5.2 to 6.8. Active acidity is essentially a function of the number of hydrogen ions dissociated by any particular acid in any particular solution. The amount of free hydrogen ions in a nickel solution when measured in grammes per litre is exceedingly small, and the term *p*H value is a mathematical device to express excessively small numbers as round figures. The more acid a solution becomes the lower is the *p*H value (a *p*H value of 6 denotes ten times the hydrogen concentration of a solution giving *p*H 7). The more alkaline a solution the higher the *p*H.

The comparator depends for its standards on pieces of coloured glass, of definite intensity and depth. These cannot fade, and the *p*H values obtained from them do not alter in the course of time. The coloured glass sections are arranged in a revolving disc and give a range of *p*H values for use with an indicator supplied. The disc is housed in a metal case, fitted with apertures for making the comparison of the colour of the solution under test against the colours of the revolving disc, the case being fitted with two acid-proof glass troughs to receive the liquid to be tested as well as the same liquid with the addition of the indicator solution. In reading, if the colour of the right-hand solution is more yellow than the lowest *p*H indicated on the disc, the solution is so acid as to be beyond the range of the instrument. The nickel solution will need to be neutralised by the addition of either nickel carbonate or liquid ammonia before an accurate test can be taken. If the right-hand colour is more purple-blue than the highest *p*H of the indicator disc, then the alkalinity of the solution must be reduced by the addition of sulphuric acid until the acidity comes within the range of the instrument.

Nickel comparator paper is another and simpler method of determining the *p*H value (hydrogen ion concentration acidity) in nickel solutions. The paper is in the form of strips coloured with stripes in seven different colours, with a broad stripe in the middle which serves as an indicator, three small stripes above and three beneath the indicator stripe acting as the colour scale. Each colour stripe corresponds to a definite *p*H value, so that according to the acidity of the nickel solution the indicator stripe will change colour to match one of these colour stripes if within the range, and the *p*H value is then read off with the aid of a scale printed on the container.

Tests of resistance to corrosion on plated iron and steel articles are obtained by the salt spray method in large plants. This method affords the most reliable method of ascertaining the permeability and the "weathering" properties of the deposited metal. In a few hours results are obtained which represent definite periods of weather exposure, and which enable any stated period of durability to be obtained and guaranteed.

In small plants a quick method of obtaining the desired information is provided by applying a moistened test paper to the coating. The test paper is covered with a solution of potassium ferricyanide and sodium chloride in agar jelly, and this reacts with any bare iron or copper spots in the formation of a blue dot in the case of iron, or a brown coloration in the case of copper.

The main consideration in the upkeep of a cyanide copper bath is usually the free potassium cyanide, which should be maintained at about 1½ oz. per gal. The amount can be readily estimated by a test set, which gives the weight of free potassium cyanide per gallon in a solution by a simple titration.

Meetings and Discussions

In this issue we reproduce parts of the addresses delivered by four chairmen of I.E.E. Centres, all on very different subjects but all of equal interest. We also deal with Mr. J. R. Beard's presidential address to the Association of Supervising Electrical Engineers in which the principles of power station siting and designing are reviewed. The presidential addresses to the Institutes of Fuel and Welding form further items in this section.

Extending Domestic Use

THE importance of "unit building" must be recognised as a problem of the first magnitude, said Mr. E. L. Morland (superintending engineer, distribution section, Liverpool Corporation) in his inaugural address as chairman of the Mersey and North Wales (Liverpool) Centre of the INSTITUTION OF ELECTRICAL ENGINEERS at Liverpool on October 17th. Builders of new estates, he said, had been aware for many years that without electric lighting they would be unable to sell their houses. The day was not far distant when the public would demand, in a similar manner, the installation of appliances to enable them to run their homes with the aid of electrical energy, and builders would vie with each other to provide them.

As an example of private enterprise, in one district over four miles of roads had been built up with electricity as the sole means of lighting the roads, and providing energy to the 1,045 houses, as the builder refused to allow an alternative method to be provided on the estate. In one instance, 253 council houses occupying approximately 15 per cent. of an area enclosed by a circle of one quarter-mile radius were each provided with an average installation totalling 18 kW consisting of a cooker 7 kW, wash boiler 3.5 kW, two radiators 4 kW, water heater 2 kW, cupboard heater 0.5 kW, and iron and lighting 1 kW. The maximum demand amounted to 1,000 kW and occurred on Sunday and Christmas Day; the total consumption for one year amounted to 1,009,059 kWh, an average of 3,988 kWh per house. Dwellings of a similar type using energy for lighting alone averaged 200 kWh during the year.

The rateable value charge of the two-part tariff, which was collected with the rent, amounted to 1s. 2d. per week, and the kWh charge was 0.5d. The installation and the appliances were included in the equipment of the houses, and were maintained without additional charge. The total amount collected for the year amounted to £2,869, an average of £11 6s. 10d. per house. The cost of the low-voltage network, laid underground, amounted to £9 10s. per house. The high-voltage cables through the estate carried industrial load on week days, but were free for the Sunday load.

Extensive Opportunities

According to Ministry of Labour figures plans for 35,551 new dwellings were passed by the principal local authorities during the three months April to June of this year. The average cost per dwelling amounted to approximately £486. The total value of the electrical installations and appliances to be fixed in these new houses probably amounted to between 2 and 3 per cent. of the average cost of the house, whereas the figure should be approximately 10 per cent. to provide for a fairly complete range of appliances for everyday use. Based upon the recorded average for each house of 3,988 kWh per annum, the total consumption would amount to approximately 6.3 per cent. of the yearly increase of kWh sold in this country during 1936 as compared with that of the previous year.

Domestic Load-building Engineers as Citizens Power Station Sites

Distribution in rural areas seemed to divide naturally into two parts; first, it appeared extremely unlikely that any urbanisation of the countryside would take place in the years ahead. In those areas the difficulty of balancing income and expenditure appeared upon occasions to be unsurmountable. Secondly, a change of country characteristics was taking place on the fringe of most populous areas, so that the rural overhead distribution, which had served its purpose as a pioneering effort, could be taken down and used elsewhere as the urban area extended its boundaries. The initial cost of the effort would then be made up of the cost of labour, erecting and removing, plus depreciation and loan charges on the capital value of the materials. The presence of a supply of electrical energy in these districts did encourage the development of that portion of a rural area adjacent to the urban area, and in many instances had resulted in the development of communities remote from any existing urban district.

Criticism was often levelled at the varying tariffs in use, but load factor and peak loads were fundamental and must be continually faced. How was the two-part tariff for houses to be dealt with? Was the demand charge or the unit charge to be lowered, or would we reach the Utopian ideal of a demand charge, or electricity rate, without a meter?

The Engineer and the Community

THE relationship of the engineer, in his corporate capacity, to the community in which he lives was the subject of the inaugural address of Mr. W. J. Cooper (burgh electrical engineer, Hamilton) as chairman of the Scottish Centre of the INSTITUTION OF ELECTRICAL ENGINEERS at Glasgow on October 11th.

The setting-up by the senior engineering institutions jointly of a Committee of Public Relationships was a significant collective effort, said Mr. Cooper. Neither the groups which had already tackled this question, nor the groups now about to consider it, had approached it entirely on ethical grounds, but it was likely that the more closely one came to a true appreciation of the conditions necessary to the establishment and maintenance of good public relationship, the more clearly would the ethical basis stand out. Those conditions appeared to be, first, the importance to the community of the work which the group did, secondly, recognition and acknowledgment by the community of the importance of such work and, thirdly, and perhaps most important of all, how trustworthily, or with what degree of equity, the work of a group was made available to the community for its betterment.

Engineers, as a group, did not consider themselves as cast from a special mould. Any attempt to assess the relative values of individuals, or groups, within the contemporary social structure merely confirmed the complete interdependence of a modern community. In practice, the engineer was to a great extent the interpreter of the work of the scientist and research worker. In the work of the engineer there must also be included the training and technical education of those who were to carry on his work, and not by any means of least importance was the work of the engineer in the market-place, while the pace of social and economic progress was determined by engineering achievement. The work of the engineer in its more arresting forms was without doubt brought before the community and noted, but the community's most intimate contact with its needs was in the price it paid for them. In the journeyings of those needs through the tortuous ways of the market-place they seemed to acquire

Control of Plating Solutions. (*Continued from previous page*)

An outfit of major importance in the plating shop is used for testing deposits: (a) For free cyanide content in copper, silver and gold solutions; (b) for free cyanide content in brass solutions, and (c) for free acid content in acid copper solutions. The "free cyanide" content of these solutions is extremely critical, and periodical determination is of the greatest value. This can be made in a few seconds and enables the plater to keep the bath constant in composition and uniform in performance.

Acid copper baths also can be quickly examined for free acidity, and the information obtained, coupled with a density reading, gives the amount of crystallised copper sulphate and free sulphuric acid present. Brass solutions should be tested every three days for free cyanide content, as this is the most important factor governing the rate at which the anodes dissolve in the solution.

It is found that if the free cyanide content is maintained, very little brass salts are required. A good free cyanide content for a hot solution is about 1½ to 1¾ oz. per gal., and for a cold solution 2¼ to 2½ oz. per gal.

The main constituent of a tin solution, apart from the metallic tin, is the free potash, and deficiency or excess of this is the principal cause of a bath functioning badly. A tin test set enables the plater to ascertain the free potash content quickly, and correct any deficiency by an addition of potash or any excess by the addition of tin salts.

In working a cadmium plating equipment, certain periodical adjustments to the solution are necessary if the bath is to work at its best. The essentials of successful cadmium deposition are: (1) The maintenance of the metallic content of the solution; (2) the maintenance of the requisite "free cyanide" content; (3) a ready test for the thickness of deposit. The use of a test set ensures that all these conditions are stabilised with the minimum of delay.—A. A.

such an enhanced value, made evident in the price, giving so much concern to the community, that the work of the engineer in making the need available was almost completely hidden.

It would, therefore, seem that the engineer in his corporate capacity might have a duty to the community, to keep it informed about the work which he did from day to day for the community's ultimate betterment so that the community in its collective citizenship might be able properly to assess the value of the work of the engineer and, most important of all, prevent its misdirection. The form of contact must be educational rather than propagandist, since the purpose was to help the community how to think of the work of the engineer, not what to think of his work. Space value in the Press was now so enhanced as to be beyond the financial resources of the engineering institutions, but the medium of radio broadcasting held great possibilities so long as the contact was based entirely on ethical or educational grounds. Perhaps an extension of the idea lying behind the I.E.E. Faraday Lecture was about the only form of contact with the public which the engineering institutions could at present sustain.

I.E.E. Milestones

THE present session of the I.E.E. will include the fiftieth anniversary of the day (December 20th, 1888) on which the original Society of Telegraph Engineers and of Electricians (which held its first meeting on February 28th, 1872) changed its name to the INSTITUTION OF ELECTRICAL ENGINEERS. Mr. J. W. Atkinson (G.P.O., Leeds) therefore considered it appropriate to devote his inaugural address as chairman of the North Midland Centre at Leeds on October 11th to "things past," remarking that he was not in a position to assess the effect of the change of title on the scope of the work undertaken by the original Society in the following few years.

That aspect of the matter would be dealt with in the forthcoming "History of the Institution," which was being compiled by Mr. Rollo Appleyard, but Mr. Atkinson said he felt that the change must have proved of great value in dealing with such important matters as regulations for the prevention of fire risks arising from electric light (1882) which was the subject of acute and prolonged controversy; the unification of electrical definitions, nomenclature and notation (1885); the need for a standardising laboratory (1885) with special reference to measuring instruments; the action taken (1886) to secure the amendment of the Electric Lighting Act of 1882, and many other milestones on the road of progress.

The initial membership of the Society, with Dr. C. W. Siemens as president, was 110 which grew during the first year to 353. By the end of 1888 when Sir William Thomson (afterwards Lord Kelvin) was elected first president of the Institution the membership had risen to 1,500, while last year the total was 18,252. That expansion had been accompanied by the establishment of eight local centres and seven sub-centres in Great Britain, two local centres abroad, and also by the creation of the Meter and Instrument, Wireless, and Transmission Sections as well as nine students' sections.

Supply Problems

ACHIEVEMENTS of the electricity supply industry and some of the difficulties that hamper its fuller development were discussed by Mr. Harry S. Ellis (general manager and chief engineer, West Gloucestershire Power Co., Ltd.) in his address as chairman of the Western Centre of the INSTITUTION OF ELECTRICAL ENGINEERS at Bristol on October 10th.

Since the load factor of the generating stations of public authorities and companies, considered collectively, was of the order of 35.5 per cent., he found it difficult to imagine what scope there was for further substantial economies in generation and transmission costs as the result of greater use of the grid and other transmission lines.

Continuity of supply was one of their principal maxims and the three essentials for the ultimate success of electricity distribution were competitive prices, a steady voltage and a continuous supply. They could not expect to retain the goodwill of consumers, however reasonable the charges might be, if they failed in these last two essentials. They managed to do so in the past to a great extent because, in the majority of cases where electricity was used only for lighting and, perhaps, an electric iron, which fortunately retained its heat for considerable periods, interruptions which occurred in the day time, unless they were of long duration, were seldom noticed by consumers. But the use of electricity for other services, such as cooking, heating, water heating, radio, television, electric clocks, and daylight signs, had developed to such an extent that bad voltage, more particularly in the case of cookers, and interruptions were readily detected and consumers would no longer tolerate them. It was necessary, however, that supply undertakings should provide distribution systems which would ensure full and efficient supplies to their consumers. Mr. Ellis stressed this question of continuity because to his mind it was a matter of very considerable importance in these days when so many of the more progressive supply undertakings offered facilities, such as hire and hire-purchase schemes, whereby their consumers were encouraged to extend the use of their supplies.

It was regrettable that distribution was being hampered to an increasing extent by delays in connection with the granting of wayleaves under Section 22 of the Electricity (Supply) Act of 1919. This difficulty arose, mainly, Mr. Ellis thought, because of the judgment given in the King's Bench Division of the High Court in December, 1932, in what was now known as "the Pitt case," which held, among other things, that the "terms, conditions and stipulations," whereby the Minister of Transport was empowered to give consent to the construction of overhead lines, did not include pecuniary terms, and that claims in respect of compensation for wayleaves ought to be determined by arbitration under Section 17 of the Electric Lighting Act, 1882, whereas previously it had always been taken for granted that the section gave the Minister, as the words seemed to imply, full power not only to grant wayleaves but to settle the terms as well.

Carrier Telephony

THIS means of increasing the utilisation factor of trunk cables is to be the subject of Mr. P. H. Pettifor's address as chairman of the London Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS on October 31st. The author defines this system as one in which the normal voice frequencies are raised to a band of higher frequencies before being transmitted, conversion to the normal voice-frequency band taking place at the receiving end of the circuit. If different circuits have their voice frequencies raised by amounts such that the high-frequency bands do not overlap one another, a system of several circuits can be arranged over one cable pair without interfering with one another.

The four types of high-frequency cable employed in this country are: (1) A 24-pair star-quad paper-insulated cable used up to about 60 kc/s. (2) A cable containing a pair of air-spaced self-locating conductors, such as the television cable recently laid round London. (3) A co-axial cable containing four co-axial conductors, such as that recently laid between London and Birmingham. (4) A co-axial cable containing one co-axial conductor insulated with "Paragutta" and made up in the form of a submarine cable.

In some cases a special cable is not laid, but the loading on an existing telephone cable is reduced and one of the smaller carrier systems used, in which the highest frequency is only 16 kc/s.

The principles of carrier telephony closely follow those of wireless broadcasting, inasmuch as the voice frequencies are caused to modulate a carrier frequency, thereby producing side-band frequencies according to the well-known equations, but in carrier telephony one side-band only is transmitted, the other side-band and the carrier frequency being suppressed.

Power Station Sites and Design

IN his presidential address to the Association of Supervising Electrical Engineers on Tuesday last Mr. J. R. Beard discussed the main principles underlying the choice of position and type of plant for modern generating centres. In the first case account had to be taken of the sources of transport of coal, water for condensers (600 lb. per lb. of fuel burned) or cooling towers (6 lb. per lb.) the disposal of flue gases and ashes, the price of land and egress for transmission mains.

Moreover, security from air attack called for limitation of the amount of plant on individual sites and a transmission system so designed that no large blocks of load were dependent on one station. This requirement had been met by the interlinking of stations by means of the grid, which, in addition to reducing the proportion of spare plant from 70 per cent. to just over 20 per cent. and the heat value of the fuel required per kWh by 15 per cent. in five years, also created a pool of spare capacity; this had enabled large and economical plant to be retained and at the same time had dealt with the limitation of total capacity by limiting the number of units installed.

Transport might account for from 10 to 25 per cent. of the total cost of coal. Water transport was so much cheaper than rail that stations with access to the sea might pay very much less than others which, though nearer to the coalfields, were dependent upon the railways. The direct-cooling capacity of many rivers was approaching exhaustion; sites on estuaries often involved heavy expenditure on civil engineering work, and the direct use of sea water for condensing had sometimes

had unsatisfactory results. The capital cost of a site where concrete cooling towers were installed was often less than that of a site using water directly for condensing and the saving might largely offset the 5 per cent. reduction in efficiency entailed. Sewage effluent had been successfully employed to provide the water needed by such stations, and the method would probably be more extensively used.

Ashes represented some 12 per cent. of the coal burned and from a large station might come to more than 50,000 tons per annum. On inland sites land on which to dump them might have to be acquired, but a few undertakings had been able to turn them into a source of revenue. Up to 95 per cent. of the grit from stoker-fired boilers could nowadays be removed, but with pulverised coal firing more expensive electrostatic precipitators were required. The use of pulverised fuel, however, was likely to expand as it had many advantages, including the ability to vary the type of coal used, thus decreasing its cost. Sulphur in the flue gases had been eliminated by two methods in this country, but he believed not abroad. Land was also required for running and reserve coal storage; for a large station the reserve might be from 50,000 to 100,000 tons.

Regional Development

The problem of selecting a power-station site was a regional one. This point of view had been greatly helped by the development of power companies and other large undertakings, and in recent years by the advent of the Central Electricity Board, which was able to plan a national generating plant programme (about 600,000 kW per annum) in co-operation with the supply authorities. The speaker then presented a table giving the kW installed at the principal generating stations during the last ten years or now under construction. New selected stations not in operation before 1928 numbered 25 and had a capacity of 2,986,000 kW; extensions to 86 selected stations existing before that time amounted to 3,639,000 kW, while there were extensions to 12 non-selected stations (mainly in the earlier years) of 75,000 kW. The total number of stations having modern plant and an aggregate capacity of 6,700,000 kW, was thus 123. As eventual development was evidently contemplated with 100,000 to 200,000 kW stations (forming part of a generating block of from 1,000,000 to 5,000,000 kW) the size of the units could be selected primarily with regard to capital and operating costs; load factor, therefore became the vital consideration.

Power station design was continually advancing and at present new plant tended to take over the base load, leaving peaks to the less efficient units; this method reduced running costs by more than any saving in capital charges obtainable by constructing more cheaply special peak load plant. Nevertheless, the present growth of load required more plant than could be absorbed in base load working and new plant would tend to fall into two categories, *viz.*, that installed on the best sites for dealing with the base-load and that for two-shift operation for taking the balance. In the latter case low capital expenditure rather than efficiency would be aimed at and the stations must be capable of being quickly started up and shut down.

Steam Technique

Regarding technical improvements, steam conditions of 1,200 lb. per sq. in. and 970 deg. F. (assuming a maximum wetness of 13 per cent.) would increase efficiency by 12 per cent. compared with the 650 lb. and 850 deg. being adopted for most new plant in this country. As temperatures could not at present be raised much above 950 deg. F. any increase above 1,100 lb. per sq. in. involved either a higher wetness factor or reheating the steam to its initial temperature after partial expansion. With reheating, steam at 1,200 lb. could be employed without exceeding 850 deg., for which ordinary steels were suitable, to give nearly the same increase in efficiency as with the higher temperature on a non-reheat cycle.

Probably the most important development in boiler design had been the increase in size of the combustion chamber and the consequent decrease in heat released per unit volume which improved efficiency and facilitated dealing with ash. Another advance had been the water-cooled furnace wall which increased radiant heat transmission from the furnace gases to the water and reduced maintenance of furnace linings. Forced circulation boilers were lower in capital cost for the same output and some were particularly suitable for producing high-pressure steam. In the Loeffler boilers at Brimsdown the whole of the heat of the fuel was transmitted to the steam and not to the water, which was evaporated by pumping superheated steam through it. The La Mont boiler was more normal, the water from the drum being pumped through nozzles which secured even distribution and rapid passage through the tubes.

Perhaps the most important of present-day boiler problems was the maintenance of the unit in continuous operation over long periods, *e.g.*, six months or a year. If boiler availability were equal to that of turbines, the steaming capacity could be reduced to four-fifths of what was now necessary. The ultimate ideal was one boiler per turbine.

Fuel Trends

THE relationship between fuel and industry was outlined in the presidential address of Lieut-Col. J. H. M. Greenly to the Institute of Fuel in London on October 13th.

Col. Greenly pointed out that in Great Britain more coal was consumed per head of the population (3.9 tons in 1937) than in any other country. The growth of population during the past 300 years had closely corresponded with the increase in coal consumption. At such a rate British coal resources would be exhausted in 150 years; but the rate of expansion in coal consumption had steadily slowed down to an average over the past 25 years of rather less than 0.1 per cent. and it would appear that no marked increase in the present consumption was likely to occur until new uses were found for coal that would create large demands outside the fuel and power supply spheres.

Four principal ways of producing liquid fuel from coal were at present being exploited on a commercial scale, and Col. Greenly sounded a note of warning about their possible significance. At present, he said, liquid fuels derived from all four sources did not represent one per cent. by weight of the coal mined in Great Britain.

Consideration of the relative reserves of oil and coal focused attention on the transport problem, and the apparent need for systematic long-range research into the possibilities of economising in the uses of liquid fuels, or the substitution of coal for oil. Electricity, as a medium for utilising the energy of coal for traction purposes was already well established in railway electrification and in trolley-buses, and it should be borne in mind that the free-running vehicle operated by accumulators might lead to some displacement of the internal combustion engine if and when electrical research perfected the light-weight high-capacity accumulator. One must sometimes wonder why the electric vehicle, which was a rapid, silent and pleasant form of transport, had almost completely disappeared from the streets of great cities; though, for all-purpose long-distance car or lorry service, it was probable that the electric vehicle would never form an efficent substitute for the existing type of engine.

One of several roads at Peterborough now efficiently lighted by " Philora " 100-W sodium lamps in Revo fittings. The authorities are stated to be extremely pleased with the results

Training Mining Engineers

IN his presidential address to the Lothians' Branch of the Association of Mining Electrical Engineers, at Edinburgh, Mr. W. Brazenall, Ormiston, said that too much attention was paid to plant, and not enough to the personnel. Facilities should be available in all mining areas for the education of apprentices. The curriculum of country evening classes should be more closely related to that of the more important

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

The Plug and Socket Problem

IN answer to the query of Mr. Thomas in your to-day's issue, all the four houses were equipped with round-pin socket outlets. Alternate standard and non-standard sockets are sufficient to account for my having to change the plugs, but actually the non-standard types were different from each other. So far, the only ones complying with B.S.S. 546 that I have met in houses I have bought are those I have had installed.

As stated in my article, I hold no brief for any type of plug, I should be quite content to take the flat-pin design as the standard if we could get down to one type, and one type only, so that eventually we should get real interchangeability. If we create and maintain two standards, people changing houses are always liable to be faced with the unnecessary nuisance of having to change the plugs.

I suggest that it is essential to have a three-pin as the standard and that two sizes, 15 A and 5 A, will cover all normal household requirements. While I should be prepared to offer an opinion as to which type held the balance of advantages, I would not let that opinion stand in the way of real standardisation, which appears to be the only difference between Mr. Thomas and myself. I must admit, however, that I am extremely sceptical as to whether the electrical industry will do anything effective in the matter and rather expect it to continue to discuss the relative merits of the two types, when the real need is to get down to one type.

It may seem a long cry from standardisation of frequency to standardisation of one type of plug, but I am reminded that Parliament took the decision to standardise frequency. It is fairly certain that it would not have come about in any other way. J. N. WAITE.

London, W.C.2, *October 14th.*

Rationalisation in the Home

I was extremely interested in the forceful article by Lady Brooke, M.A., in your issue of October 7th. There is undoubtedly a tendency on the part of engineers to exaggerate the technical aspect of electricity in the home, particularly where space heating is concerned. The speed with which modern industry makes available to the public recent scientific developments is, however, tending continually to decrease the gap between the research laboratory and the home. The marketing by this company of automatic thermostat-controlled space heating devices enables the humble user of electricity to have all the benefits of automatic control now and not as "an ultimate dream of perfect electrification."

The possibilities of mass production of scientific equipment for the "man in the street" are unbounded, and it is up to all concerned in the electrical industry to further this tendency. M. I. LIPMAN,

Sales Manager, THERMOVENT HEATING.

Southend-on-Sea, *October 14th.*

I would certainly not accuse Lady Brooke of flogging a dead horse when she writes on the use of tubular heaters for domestic heating; in fact, this particular horse is far from fully grown and is still very much in the colt stage.

Her remarks on thermostatic control are, however, rather wide of the mark. A reliable thermostat costs less than 30s. and can just as easily be applied to the houses and flats that ordinary people live in as to the dream palaces of the enlightened few.

In the example she selects for illustration, if 240 W of tubular heating is sufficient in cold weather it will certainly give more heat than is required in mild weather, so that heat is being wasted. Thermostatic control will give the same temperature in mild weather as in cold weather, but at a cost of £2 2s. per year instead of £3 8s. 5d., a saving that would very soon pay for the thermostat. E. M. ACKERY.

Sydenham, S.E.26, *October 13th.*

Suggested Division of Scottish Centre

I understand that several members of the Scottish Centre of the I.E.E. have under consideration the question of recommending that a new sub-centre should be formed at, say, Carlisle, to deal with the south-west of Scotland and the north-west of England, and are about to approach the "powers that be" in London.

Many local members are of the opinion that the whole question of the Scottish Centre should be raised with London as it is felt in the Glasgow district that the time has now arrived when the Edinburgh branch should be separated from Glasgow and run on its own. It is also the opinion of many that two Scottish branches should be formed, *i.e.*, East Centre and West Centre, the former taking in, say, Aberdeen, Dundee, Perth, Fife, Edinburgh and south to the border; the latter dealing with the west coast say from Oban to Carlisle.

Some difficulty might be experienced in drawing a line of demarcation between the east and west; I think, however, that such a difficulty is not insurmountable. The matter is one which I think could with profit be discussed in your journal.

October 12th. SCOTTISH MEMBER.

What is an Electrical Engineer?

Correspondence upon this topic appears to centre around different points at different times but I think what is in most engineers' minds is the fact that the I.E.E. has obtained a monopoly of the use of the style "Chartered Electrical Engineer," and that being so it is under an obligation to the public to supply thoroughly sound men, which many claim, and I agree, it is not doing. The Institution management may think they are but that is another matter. The trouble is that institutions, and I am a member of a few, get into the hands of idealists and educationalists who attach far too much importance to the ability to solve fairly advanced theoretical problems, whereas the ability to do the actual work, whatever it may be, thoroughly and well, deserves as much consideration. Thousands of theoretical problems may be set, of course, but it should not be lost sight of that in practice there are also thousands of practical problems to be solved and that the brilliant solver of theoretical conundrums is almost invariably the opposite on the practical side.

The best type, I find, is the man with the extensive practical training and experience coupled with a reasonable amount of theory who can do a good job in a reasonable time whether it be designing, constructing, or repairing. He is the real

Meetings and Discussions (*Continued from previous page*)

classes in the towns where mining electrical engineering was taught. Local authorities should provide such facilities as would be necessary to prepare apprentices to gain the certificates of proficiency which the Mines Department would in future require colliery electrical staffs to hold. Such certificates would raise the status of the colliery electrician and consequently provide the necessary prospects of advancement urgently required to attract and hold the best type of boy and man to mining electrical engineering.

Welding Progress

SPEAKING as president of the INSTITUTE OF WELDING at the opening meeting of the Manchester Branch on October 12th, Sir William Larke stated that the past year had witnessed not only a great extension in the application of welding, but also an increasing demand on the part of the users for still wider applications, which involved in many cases the solution of new problems, metallurgical as well as mechanical.

The Institute, he said, through its research organisation which was now firmly established, had set up in addition to the main Research Committee five principal committees and twelve sub-committees, to each of which had been allocated the investigation of a separate phase of the problems which were involved.

The Universities of Birmingham, Bristol, Cambridge, Durham and Glasgow had all been enlisted in the work of research and investigation. In co-operation with the shipbuilders' institutions, the classification societies, the steelmakers and others, a special testing machine had been devised and was being set up in Scotland to ascertain the soundest, lightest and most economical methods of welded construction on the grounds of equivalent efficiency and strength for riveted bulkhead stiffeners, deck beams and girders, shell framing, &c., as laid down in existing rules and regulations. These results should enable new tables to be drawn up by the Board of Trade and classification societies, similar to those at present in use for riveted construction.

In the structural field the new regulations which the London County Council had established had increased the stress on welded structures to 8 tons per square inch. A new handbook on arc-welding procedure would be published by the Institute next month.

electrical engineer, but apparently cannot obtain recognition. Now how would the professors and learned people, for instance, like to be told that because they cannot replace a coil in an armature, balance it, grind a shaft to fine limits, set up a complicated winding machine on any of its many jobs, in shop times, and solve quickly and accurately the many thousands of designing, production and repair problems that arrive in a continuous stream, they have no right whatsoever to term themselves electrical engineers. Such, however, is the case, although they may, perhaps, be termed electricians. This may be a terrible shock to a lot of people, but it is true, and in reality they are no better off than the really practical man with only a smattering of theoretical knowledge. There is, in fact, a vast difference between an electrician and an electrical engineer. The former is, perhaps, more easily visualised as a theoretical man but the latter requires real practical ability and knowledge which usually boils down to sound mechanical training, experience and aptitude.

The real trouble seems to be that the Institution has become too hard and fast in its admission rules. As an instance, a thesis can be presented, but a number of articles written by a candidate for the leading engineering journals including your own, which surely would not have been printed had they not had merit, carry no weight at all.

To sum up, in the past the Institution was mostly composed of the sound practical electrical-mechanical class which did it credit but the inflexible rules now preclude this type of man much to its detriment. It therefore appears time that something should be done to encourage the type of applicant more likely to enhance its reputation instead of giving him the cold shoulder.

THRICE CHARTERED.

October 10th.

Consumers' Grouses

I feel that I must reply to the author of "Consumers' Grouses." I agree with every grouse that he has with one exception: the prospective consumer should not ask the wireman to install extra points or make alterations. He is there to do the work according to schedule and specification or instructions given to him by his foreman at the commencement of the job; alterations or extras to the original schedule should be specified in writing to the consumer's advisor or engineer.

The latter is the person to be blamed for so much dissatisfaction among consumers. If the consumer's engineer did his job properly there would be no necessity for extras or alterations. The type of person usually entrusted with this task is most unsuitable. A study of the "Situations Vacant" columns of the ELECTRICAL REVIEW will enable the reason to be understood. He must be an experienced estimator, a draughtsman, have technical qualifications, be in possession of certain certificates, be able to control labour, be a good salesman, and, above all, be able to produce three recent testimonials; in fact, be master of all trades except consumer's advisor. Too much thought is given to men with technical qualifications and certificates; holders of such are not experienced in advising consumers, showroom work or any other practical task.

I consider it would be a good plan if companies' managers were to recruit men suitable for the task of consumer's advisors from their wiring staffs; these men usually work among all classes of people, and gain more inside knowledge of their likes and dislikes than any manager or holder of technical qualifications. When a man so recruited has proved his worth he should be provided with facilities for furthering his education.

F. E. S. (WIREMAN).

October 10th.

Adequate Wiring

We have been very interested in the article in your issue of October 7th entitled "Capturing the Domestic Load," and particularly in that part of the article relating to the importance of publicity. The publicity which Mr. Dale suggests is very much on the lines of that now being carried out in connection with the Adequate Wiring Campaign in the United States.

The time is ripe for an adequate wiring campaign in this country, and in planning such a campaign considerable advantage could be taken of the publicity methods used in the U.S.A. These include almost all the suggestions made by Mr. Dale, and, in addition, a number of undertakings have erected model houses to demonstrate the advantages of adequate wiring. These model houses have drawn very large numbers of visitors, and the advantage to the electricity undertakings has been most felt when visitors commenced to ask builders whether their houses were constructed in accordance with the requirements of the Adequate Wiring Campaign.

No better centre could be found for the erection of an adequately wired house than London, as was proved by the attention given to the pair of cottages erected in Aldwych in 1933 as the result of a Building Centre competition, and it would be for the good of the whole industry if interested organisations could co-operate in the planning of such an exhibition.

COPPER DEVELOPMENT ASSOCIATION.
H. G. Taylor,
Electrical Engineer.

London, S.W.1, *October 18th.*

Power for the World's Fair

Guarding against breakdowns

IT is expected that the demand at the World's Fair to be held in New York next year will amount to 65,000 kVA at 90 per cent. power factor and in the exhibit section will average 50,000 kW per sq. mile and special steps are being taken to ensure continuity of supply. Power will be supplied, the *Electrical World* states, from two electrically independent 45,000-kVA sub-stations, situated at opposite sides of the area, each containing one 15,000- and three 10,000-kVA transformers stepping down from the 27,000-V 60-cycle system of the Consolidated Edison Co. to 4,150 V.

One of the company's feeders will be connected to one transformer without intervening switchgear and the two groups of four feeders will follow different routes to the main sub-stations. The outdoor transformers with their regulators are separated from one another by fire walls and enclosed at ends and rear by asbestos-board fences. There are two 415-V bus-bar sections in each sub-station in separated switchrooms interconnected by a cable having an oil circuit-breaker at each end; to each section the lower-voltage sides of two transformers are connected by oil circuit-breakers.

Similar switchgear with overload protection controls 4-kV radial feeders which serve the large buildings directly; these feeders are duplicated from the other sub-station so that the illumination provided by one overlaps that from the other and the loss of half a sub-station would not entail complete darkness at any point. Smaller exhibitors' buildings are fed by only one distribution cable, but emergency lighting can be obtained from local storage batteries.

The 4-kV underground feeders have conductors of 0.39 sq. in. near the sub-station, decreasing to 0.17 sq. in. at the far end; it is calculated that 145 A at 40 per cent. power factor could be taken almost anywhere with a maximum voltage drop of 2 per cent. at that point. The aggregate length of the heavier sections is 260,000 ft. and of the lighter 300,000 ft.

Non-metallic ozone-resisting sheathing is being used throughout because of its high salvage value, and because splicing and teeing off are simpler. Asbestos braiding is also provided to afford mechanical protection when pulled out at the conclusion of the Fair. Three four-legged single-phase 2,400-V pre-insulated crab splices for two services are used to tap the feeder in every manhole and a bare neutral is run in the same duct as the phase conductors. The voltage is finally stepped down to 208-120 by means of outdoor transformers.

Exhibitors are to be charged under a two-part tariff subject to a fuel and tax clause. The demand charge ranges from $2.25 per kW per month for the first 15 kW to $1.50 per kW in excess of 2,000 kW; the running charge is 90c. for the first 10 kWh or less per month descending by stages to 0.7c. per kWh in excess of 180,000 kWh.

Activities at Capetown

IN his report for 1936, just received, Mr. G. H. Swingler, city electrical engineer, states that the growth in consumption was at a greater rate than in any previous year, the total of 167.6 million kWh representing an increase of 23 million kWh (16 per cent.) over that for 1935. Of this increase 17 million kWh was added in sales under the domestic two-part tariff. The average consumption under this tariff was 3,156 kWh, as compared with 2,940 kWh in the previous year. Altogether the number of consumers rose from 40,754 to 43,493. Comparative tests having proved conclusively the advantages of electric water heating in the residences of the University of Capetown, arrangements were made for the hot-water requirements of the bathrooms in all residences to be provided electrically. It was also decided to install electrode boilers of 1,410 kW at the Groote Schuur hospital. Forceful arguments directed against the policy of raiding the electricity profits for rate contributions are contained in an addendum to Mr. Swingler's report. To the contention that ratepayers, being in the nature of shareholders, are entitled to a dividend on the investment in the undertaking, he replies that they are not in fact shareholders at all as they do not provide any of the capital but merely jointly guarantee the payment of interest.

D

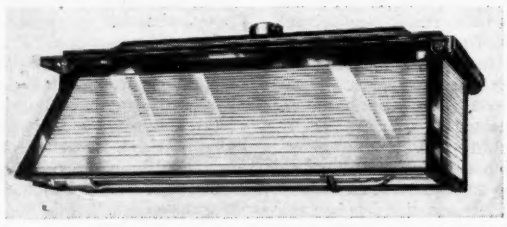
New Electrical Products

A review of equipment recently marketed

Street Lighting Fittings

BY the combination of specially designed silvered mirror reflectors fitted internally, in conjunction with refractor panels of unique design, the REVO ELECTRIC CO., LTD., Tipton, Staffs, has developed new street lighting reflectors known as the C.1289 and 10238 according to whether double-plated or single-refractor panels are fitted.

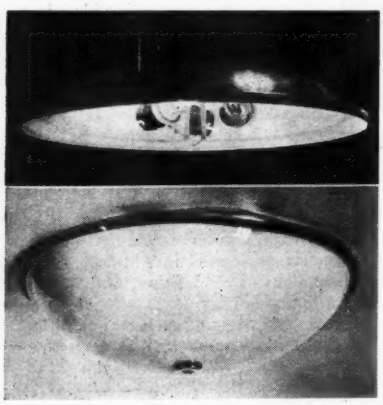
They are intended specifically for use with sodium electric discharge lamps, the prismatic formation of the glass panels in each case being scientifically designed to utilise to the fullest extent the light output of the lamp in each type of fitting. The frames are of cast iron, and the equipment is available for 50, 65, 100 and 150-W sodium vapour electric discharge lamps of the horizontal burning type.



One of the new Revo fittings for sodium lamps

Fittings for Ship Lighting

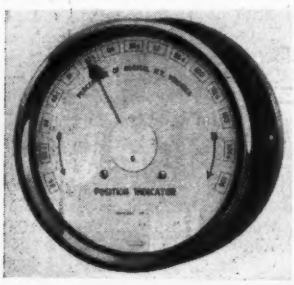
Specially designed to combine attractive appearance, ample illumination and minimum projection from wall or ceiling, the new "DZX 30" fitting of PHILIPS LAMPS, LTD., 145, Charing Cross Road, London, W.C.2, is intended for use in ships. It is a built-in unit having a diameter of 12 in. and a projection of only 3½ in., and is equally suitable for either vertical or horizontal mounting. It can be supplied for either two- or three-lamp fittings, the lamps being 40-W pearl, the bowls being of opalescent or champagne glass.



A ship lighting fitting

Position Indicator

For the remote indication of the position of movable parts ELLIOTT BROTHERS (LONDON), LTD., Century Works, Lewisham, London, S.E.13, have produced a special instrument. Among its applications are those of a tap position indicator for transformers, and a valve position indicator.



The Elliott position indicator

The instrument is of the differential induction type and is used in conjunction with a suitable potentiometer resistance. It is for operation on AC and is practically independent of ordinary variations in circuit frequency, and wave form and temperature variations. A linear scale is provided and only three wires are required between the transmitter and indicator.

The indication can be continuous throughout the travel of the moving element although in the case of tap position indicators it is more general to have a number of definite steps, in which case it can be provided with an automatic lock for the pointer so as to maintain the last instrument reading should the supply be cut off. The indicator is, however, self-setting, and will operate normally again when the supply is resumed.

The angular deflection of the instrument is 240 degrees and the movement is well damped. Two sizes, 6 and 8 in. in diameter, with scale lengths of 10 and 15 in., are available, and the maximum resistance of the potentiometer should not be more than 3,500 ohms, the resistance of each lead between the transmitter and indicator not exceeding 20 ohms.

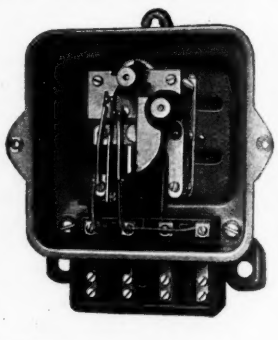
High-vacuum Plant

An improved model of the dual-purpose rotary compressor and vacuum pump supplied by W. EDWARDS & CO., Vaughan Road, Loughborough Junction, S.E.5, is now available. The main modification in the Type IV model is the lubrication system a feature of which is that oil is collected continuously from a large oil chamber and pumped to the rotor and blades. All moving parts are constantly bathed in oil, and this, together with the use of long bronze bearings, increases reliability, and it is claimed that the unit can be operated for twenty-four hours a day without skilled attention.

Before issuing from the outlet the ejected gases are filtered, and the oil collected is returned to the sump. Cooling is effected by fins on the body of the pump and a multi-blade fan. The space occupied is 16⅜ by 8⅝ by 8⅝ in., and the weight is 56 lb. The unit can be provided with a ¼-HP 1,425-RPM drip-proof motor to give a pressure above atmosphere of 10 lb. per sq. in., or with a ⅓-HP motor to give 15 lb. In each case the displacement is 3 cu. ft. per min. and the vacuum 24 in. Hg.

Motor-driven Contact Maker

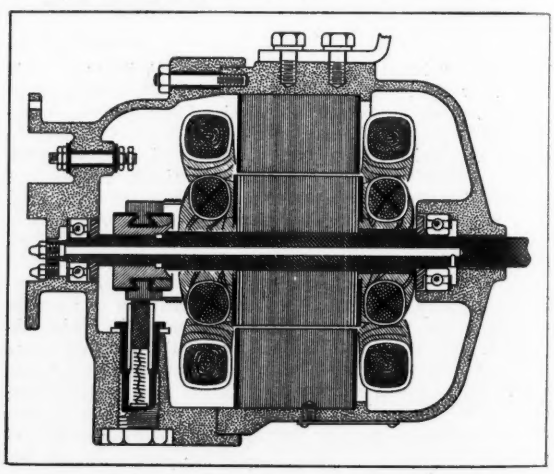
LONDEX, LTD., Brettenham House, Strand, London, W.C.2, have brought out a motor-driven contact maker. The motor is rated at only 2.8 W and is fitted with a set of make-and-break contacts suitable for up to 6 A. Although designed mainly for use in conjunction with air raid syrens it can be used as a flasher for all types of signs. Alternative cams give contact periods of 3:3; 1½:1½; 1:1 and ¾:¾ sec., so that the flashing or wailing effect of the syrens can be altered correspondingly.



The "Londex" motor-driven contact maker

Exhaust Fans

Improvements have recently been made in the "Genelex" exhaust fans made by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. These include resilient mounting for preventing the transmission of noise or vibration to the fixing surface by means of rubber cushions inserted between the fixing arm and the ring, and four-arm suspension of the motor giving a more rigid assembly and facilitating erection. The condenser for AC motors for fans up to 18-in. diameter is now built into a compartment at the end of the motor. New types of terminal block, cable gland and earth clip give ready accessibility for wiring. The outstanding features of a new design of DC fan motor are easy access to commutator and brushgear, die-cast brush holders on moulded bakelite carriers and detachable laminated poles and moulded bakelite field spools. Provision is made on DC machines for inspecting the lubricators by means of a movable pot on the smaller motors and by removable doors in the case of the larger machines.



Section through motor of "Genelex" d.c. flameproof exhaust fan showing method of lubrication

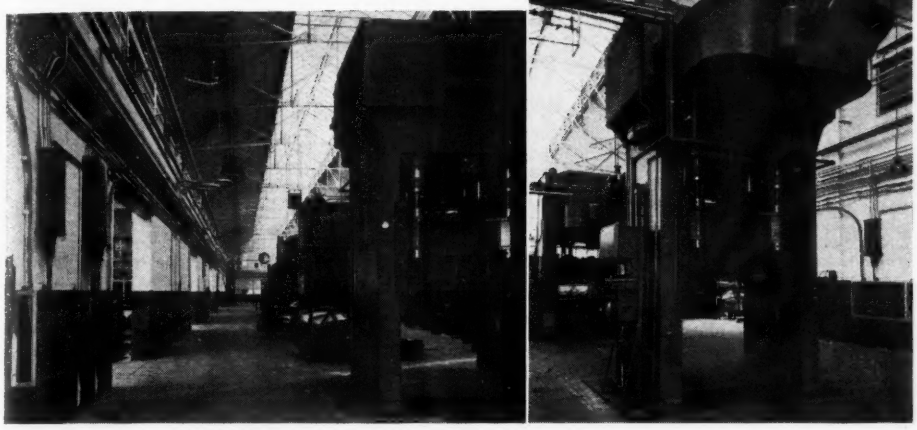
Modern Car Manufacture

The re-equipped works of Sunbeam-Talbot, Ltd.

IN combining the old-established companies of Sunbeam Motors and Clement-Talbot, the intention of W. E. and R. C. Rootes, Ltd., has been to blend the experience of each concern gained during more than thirty-five years and to use it for keeping abreast of modern developments in the production of new models. The first fruits of this policy are a four-door 10-h.p. model and a larger car rated at 21 h.p.

With a view to meeting the demand anticipated as a result of this policy, the works at Warple Way, Acton, where the manufacture of steel bodies provides the chief activity, has been entirely reorganised and equipped with modern presses, welders, cutters, as well as the usual engineering workshop machines. This has meant doubling the capacity of the electrical plant and incorporating the existing supply arrangements in the new scheme of things. The new installation includes about 120 motors with an aggregate horse power of close on 1,000 and 490 kVA of welding plant. The position was complicated by the existence of different systems of supply and kVA tariffs for each of three factories comprised in the Acton works. These factories are known as: "A," the pressed steel work factory; "B," the coachwork factory; and "C," the special coachwork factory.

A view of the heavy press rooms, showing sub-distribution boards on the left, and a "close-up" of one of the presses



Power was previously taken from the Metropolitan Electric Supply Co. at 6.6 kV and in factory "A" was transformed to 220 V single-phase for both power and lighting. Factories "B" and "C," which are adjoining, were supplied from a common sub-station in factory "C," but in the former case a two-phase four-wire supply at 200 V was taken through Scott-connected transformers for all purposes, while in the latter a three-phase system was in use with 415 V for power and 240 V for lighting. It was decided to standardise 415 V three-phase for power and to leave the existing 200-V lighting unaltered. The problem to be tackled was the transference and electrical change-over of the pressed-steel works and the change-over of the coachwork factory, without interfering appreciably with the output of the combined works.

The new sub-station showing (left) three-phase and Scott-connected transformers and 6.6-kV switch panels and (right) the 415-V switchboard

As a preliminary a new sub-station was erected in factory "B" near the centre of electrical demand. This was arranged to accommodate: (1) two new 500-kVA 6,600/415-V three-phase transformers, each with its own high-voltage switchgear having a rupturing capacity of 150,000 kVA; (2) a metering and splitter panel with power-factor indicator, ammeter and voltmeter; (3) an iron-clad 415-V board comprising two 800-A oil switches and six feeder oil switches, all with a rupturing capacity of 25,000 kVA; (4) the existing 300-kVA 6,600/200/200-V Scott-connected transformer with its high-voltage switchgear; and (5) a new iron-clad lighting switchboard.

This sub-station is fed from the Metropolitan Co.'s sub-station by means of an existing high-voltage cable, supplemented by a second cable. In the latter sub-station three new 6.6-kV panels have been installed, one controlling each cable and one controlling the feed to factory "C"; these arrangements enable the works to be kept in production should any one unit fail. From the low-voltage switchboard paper-insulated lead-covered steel-wire-armoured cables were laid to distribution boards and sub-distribution boards throughout the works. Sub-station equipment and high- and low-voltage cables were provided by Johnson & Phillips, Ltd.

Next the service for spot, stitch and gun welders, was prepared. This involved the installation of a 300-kVA three-phase to two-phase transformer (altered for 220-V output) in the electrical centre of the welding plant, and the running of a cable to this point from the splitter unit in the sub-station. The single-phase welders are balanced on the two single phases of the transformer and are connected up by intimately paired cables on cleats, no metallic tubing being used in connection with the welder circuits.

In the meantime, foundations had been prepared and all was ready for the removal and change-over. While units from factory "A" were being dismantled, transported and re-erected, the existing single-phase motors were rewound or replaced as found expedient. The opportunity was taken to modernise drives on the unit-drive principle, thus bringing into use several geared motors.

The new plant incorporates a number of massive presses with magnetic clutches, air compressors and special purpose machines, which are generally driven by G.E.C. motors, The presses provide good examples of massive fabricated construction. The heaviest—a hydraulic double-action press—is driven by a 110-h.p., 1,440-r.p.m. motor, with cam-controlled valves operated by a 1-h.p. two-speed 700/1,400-r.p.m. motor. Other interesting examples out of more than a score of types are the 90- and 70-ton wing-shaping friction presses, driven by 10 and 7½ h.p. 720-r.p.m. motors. Other presses require up to 45 h.p., the largest being a 350-ton single-action press with 45- and 10-h.p. motors. Star-delta starting is employed for the squirrel-cage motors and 43 and 35 h.p. driving the air compressors, two of which are of 200 cu. ft. and one of 103 cu. ft. capacity; a fourth set used for paint spraying is also started in the same way.

Portable high frequency electric grinders are in use and these are wound for 100 V three-phase (*i.e.*, less than 60 V to

New Books

Elementary Practical Chemistry. By G. R. SHUTT. (Pp. 126; figs. 30.) London: University Tutorial Press. Price 2s. 6d.

THE number of textbooks for the subjects of the School Certificate is astonishingly large, and since so many of them are of a high standard it must be a difficult task at times for the form master or mistress to make a choice.

The present small book provides a course of practical instruction for the three years leading up to the School Certificate. Dr. Shutt has arranged his material in an attractive manner, and he gives his instructions in a form to make chemistry appeal to beginners. Acquaintanceship with engineering students would indicate that a dislike for this subject was acquired at school, and for much of this it is not unfair to blame either the teacher or the textbook.

The present book can scarcely repel, provided the pupil has any interest in his subject at all. In the first part, where experiments and preparations are dealt with, the instructions are given in a straightforward manner, free from redundancies. The ground covered is much what one would expect and each experiment is dealt with completely, cross references being avoided. Warnings are carefully given, where necessary, while the diagrams are nicely drawn. The second part is devoted to quantitative analysis, and the third part to qualitative analysis. Both are well done. The science master will find this book a valuable asset.—S. P. S.

The Superheater in Modern Power Plant. By D. W. RUDORFF. (Pp. 293; figs. 157.) London: Sir Isaac Pitman & Sons. Price 21s.

The literature on the design and use of superheaters is somewhat meagre and scattered. The urge for higher thermal efficiency has caused steam temperatures to increase right up to the limits set by the characteristics of the metals available for superheater construction, so that superheater problems have become much more complex of recent years.

The volume under review brings together a wealth of information on its subject. It opens with a brief summary of the economic advantages of superheated steam, the brevity being due to the fact that this aspect has received a great deal of attention in many papers and text books. The statement made on page 4 that the value of superheat is approximately 1 per cent. reduction in steam consumption for each 13 deg. F., and 1 per cent. reduction in heat consumption for each 18 deg. F. appears to be incorrect as regards heat consumption, for which 1 per cent. for 26 deg. F. would be nearer the correct value. The reduction in heat consumption is approximately half the reduction in steam consumption for a given increase in superheat.

The fundamentals of superheater design are well covered by two chapters. Then follow a chapter on superheat regulation for both convection and radiant types, and others on various types of superheaters in various types of boilers, on the radiant type, separately fired type, desuperheating and interstage reheaters, concluding with chapters on the design and operation of superheaters. The author has made available a mass of detailed information, which has been presented in a lucid way, and covers an increasingly important subject very completely up to the latest developments both in design and metals available for high temperature duty. It is a valuable addition to the bookshelves of those interested in the design or use of superheaters.—J. N. W.

Energiewirtschaftsfragen.—Edited by CARL KRECKE. 2nd Edition. (Pp. 207; figs. 49.) Berlin: Franckh'sche Verlagshandlung. W. Keller & Co. Price Rm. 14.

The title and sub-title of this book may be freely translated as "Questions on Energy Economics—German Views on American Development." Its general editor was chairman of the German National Committee of the World Power Conference. Sixteen contributors have provided independent sections which may be roughly grouped as generalities regarding energy supply economics and politics in the United States (including three sections on gas supply) and the state of development there of certain applications of electricity in the household, in agriculture, and in transport. The work was inspired by the plenary World Power Conference of 1936, and the demand for a second edition shows that it has satisfactorily served its purpose.

Almost half of the book deals with energy statistics and policy in the United States and compares American and German conditions; the general editor not unnaturally expresses wonder at the vast resources of the former country relative to those of his own. Technical sections of exceptional interest are those on aluminium conductors, trolley buses, and battery vehicles. Aluminium conductors are now being used for all new overhead lines in Germany, and the subject is appropriately dealt with in considerable detail in view of the lengthy and extensive experience of such lines in the U.S.A. The two other sections above mentioned give concise summaries of interesting points regarding the electrical rivals of the petrol bus.

The book is well printed and bound. The illustrations serve mainly to stimulate interest rather than to communicate information, and it is curious that two of them show examples of American overhead line city distribution in its most hideous forms. There are numerous references to American publications where more detailed information on individual subjects may be obtained. We hope that similar books will be produced in connection with the 1938 and future World Power Conferences.—C. W. M.

The Hire-purchase Act, 1938: Its Meaning and Effect. By A. C. CRANE. (Pp. 129.) Trader Publishing Co., Dorset House, Stamford Street, S.E.1. Price 3s. 6d. net.

The Hire-purchase Act comes into operation on January 1st next so that this book appears in good time to enable those concerned to become acquainted with the intricacies of that measure. As with all legislation there are many obscure points upon which the layman requires legal guidance, and this service is well performed by the author—a solicitor of the Supreme Court.

The method of treatment is to set out the Act in sections and attach to each section an interpretation or clarification of phrases which need this attention. This is followed by a general discussion of hire-purchase law, including the corresponding Scottish Act dealing with the subject.

One section which will probably puzzle electricity supply authorities and contractors is Section 19, which deals with the separation of installation costs from the value of electrical appliances provided under hire-purchase agreements. During the proceedings on the Bill the Conjoint Conference of Public Utility Undertakings secured an assurance that installation costs would be separated from appliance costs and have to be paid whether the appliance were retained or no. Section 19, although it can be construed as meeting this point, is ambiguous, as the author points out. He infers that the words "after deducting that sum [*i.e.*, installation cost] from the hire-purchase price" which appear in the next section were inadvertently omitted. We certainly consider that he is right and it is to be hoped that this view would be taken by the Court if it became necessary to secure a ruling.—J. H. C.

The Complete Welder. London: George Newnes, Ltd., to be completed with 1,000 illustrations in about thirty weekly parts at 1s. each.

So far as one can judge from a perusal of the first issue (which is clearly written and well-illustrated) this new series should be of practical use to intelligent operatives and others who have to decide the type of welding to be adopted in any particular case and to have a working knowledge of typical apparatus. The work is divided into three sections: non-electrical methods, arc welding, and resistance welding, all three of which form the subject of articles in the current number. The publishers have secured the co-operation of leading authorities and equipment manufacturers in getting together the information thus presented.—C. O. B.

Modern Car Manufacture

(*Continued from preceding page*)

earth) at 180 cycles. The modern aspect is further emphasised by the provision of electric trucks which bring the sheet metal and dies to the presses.

The change-over of factory "B" from 200 V, two-phase, was dealt with on similar lines to that for factory "A" and the whole scheme went through without hitch or undue delays and was completed, including preliminary planning, within six months.

Power-factor correction presented an interesting problem owing to the nature of the load. A scheme incorporating the use of condensers was evolved and very satisfactory results obtained, as instanced by the following figures:—Condensers out, 0.62 lagging; condensers in, 0.82 lagging; condensers in, lighting on, 0.95 lagging. The power factors given are in each instance the lowest observed.

Considerable economies in the consumption of electricity have been effected by the adoption of a new tariff for the combined factories. The work, under the direction of Mr. A. P. Welch, A.M.I. Mech. E., works manager, and Mr. B. H. Reynolds, chief electrician, of the Sunbeam - Talbot staff, was carried out by Dynamo & Motor Repairs, Ltd., of Wembley Park.

One of the single-phase stitch welders

British Overseas Electrical Trade

Although the margin was much smaller the value of electrical exports last month—£1,671,705—was still in advance of that for the corresponding period of 1937.

A CONTRACTION in exports of electrical goods and apparatus last month was more than covered by increases in the value of electrical machinery shipped to overseas markets, but the net gain of £49,178 was much smaller than usual, representing an improvement of only 3 per cent. compared with the 12, 16 and 22 per cent. of June, July and August. Moreover, the total of £1,671,705 was the lowest so far this year. Electrical manufacturers, however, continued to fare better than most others in their overseas trade, as the Board of Trade return shows that exports as a whole declined by 10 per cent. Both last month and September, 1937, contained twenty-six working days.

To some extent trade has been hindered by political influences. Palestine, for instance, has considerably deteriorated as a market for British electrical goods and apparatus, the value of shipments this year being half as much as up to the end of September last year, and less even than in 1936. The main decreases last month, however, were in exports to South Africa and Rumania, which have assumed more normal proportions after the high levels reached last year. The chief South African demand at the moment seems to be for machinery, and last month half the total volume of generating plant exported was destined for the Union.

The position in regard to wires and cables shows some improvement, with September's total higher than for a number of months, but the value remains much lower than a year ago. The following analysis shows the chief destinations and gives comparative values (September, 1937, in parentheses):—

Rubber-insulated wires and cables.—Australia, £40,357 (£35,806); South Africa, £23,700 (£30,023); British India, £12,973 (£20,080); New Zealand, £10,664 (£10,762); other British countries, £19,535 (£26,575); and foreign countries, £7,381 (£13,625). Total, £114,610 (£136,871).

Electric wires and cables, insulation other than rubber.—South Africa, £36,482 (£58,598); Australia, £29,554 (£36,306); British India, £28,213 (£39,375); other British countries, £38,260 (£30,976); and foreign countries, £14,799 (£19,031). Total, £147,308 (£184,286).

On the other hand, shipments of telegraph and telephone apparatus are rather tending to fall off, although still well up on 1937. The chief destinations last month, with comparative values for September, 1937, were as follows:—Australia, £65,667 (£39,525); South Africa, £16,992 (£36,509); other British countries, £49,991 (£53,008); Argentina, £15,968 (£15,966); and other foreign countries, £51,505 (£38,067).

Radio exports were lower in value, the chief decrease being in transmitters. Receiving sets sent to overseas markets numbered 7,749 against 6,071 a year ago, but their value was less. In the case of valves there was quite a satisfactory increase in the number exported, from 134,915 to 151,278, and it is noteworthy that, in contrast, only 85,632 valves were imported compared with 197,752 a year ago.

In weight—898 tons—exports of generating plant surpassed last November's total, which had been the best for a number of years. In September last year exports amounted to 622 tons. Details of other plant exports in tons, with comparative figures, are as follows:—Motors, 895 (788); convertors and transformers, 801 (440); starting and controlling gear for motors, 182 (151); and switchgear, 740 (930). Although the volume of switchgear exported decreased considerably, shipments were of a greater value.

Imports of electrical instruments were unusually heavy last month. Apart from these and vacuum cleaners, however, there was a further general contraction. Radio imports, for instance, were less than half as much as a year ago, while wires and cables reached a very low level at £22,815 (£66,609 in September, 1937). Altogether, imports decreased by £149,377, or 33 per cent., to £302,798. Germany suffered most by the reduction in imports of goods and apparatus, as the following analysis shows:—United States, £70,398 (£82,125); Germany, £51,526 (£97,504); Netherlands, £44,924 (£75,311) Belgium, £17,712 (£34,095); Switzerland, £15,212 (£20,210); France, £12,694 (£9,024); Austria, £2,496 (£7,856); other foreign countries, £29,019 (£40,148); and British countries, £15,258 (£17,469). Total, £259,239 (£383,742).

TABLE I.—EXPORTS AND IMPORTS DURING SEPTEMBER

	Exports. Sept., 1938.	Exports. Inc. or dec. compared with Sept., 1937.	Imports. Sept., 1938.	Imports. Inc. or dec. compared with Sept., 1937.
Submarine telegraph and telephone cables	£14,527	+ £2,342	*	—
Telegraph and telephone wires and cables (not submarine)	60,259	+ 6,629	*	—
Other insulated wires and cables	261,918	— 59,239	£22,815	— £43,794
Radio receivers, not radiograms (excluding valves)	33,126	— 5,003	8,907	— 5,405
Radio transmitters (excluding valves)	18,913	— 7,918	*	—
Radio valves	41,738	+ 3,722	10,078	— 14,393
Other radio parts and accessories	49,465	+ 2,997	62,508	— 28,433
Telegraph and telephone apparatus (other than radio)	200,123	+ 17,048	*	—
Electric carbons	*	—	4,013	— 6,343
Incandescent lamps	47,366	— 6,773	10,802	— 2,332
Other lighting apparatus	51,486	— 3,051	44,738	— 12,211
Primary batteries	15,639	+ 1,394	*	—
Accumulators	42,918	— 11,897	*	—
Electric cooking and heating apparatus	24,729	— 4,740	*	—
House service meters	14,600	— 1,414	*	—
Other electrical instruments	22,058	+ 450	42,636	+ 17,130
Insulating materials not elsewhere specified	20,922	— 1,036	*	—
Unenumerated electrical goods and apparatus	110,921	— 958	52,742	— 28,722
Electric generators up to 200 kW	37,236	+ 11,182	*	—
Electric generators over 200 kW	114,146	+ 27,177	*	—
Electric motors	144,209	+ 21,738	16,028†	— 11,036
Convertors and transformers	86,935	+ 36,769	*	—
Starting and controlling gear for motors	48,297	+ 9,560	*	—
Switchgear	172,770	+ 6,412	*	—
Other electrical machinery	15,813	+ 2,942	12,072	— 15,139
Electric vacuum cleaners	21,591	+ 845	15,459	+ 1,301
Total	£1,671,705	+ £49,178	£302,798	— £149,377

* Not classified separately. † Not railway and tramway motors.

TABLE II.—BRITISH ELECTRICAL EXPORTS DURING SEPTEMBER

Destination.	Goods and apparatus, Sept., 1938.	Inc. or dec. compared with Sept., 1937.	Electric generators, Sept., 1938.	Inc. or dec. compared with Sept., 1937.	Electric motors, Sept., 1938.	Inc. or dec. compared with Sept., 1937.	Other electrical machinery, Sept., 1938.	Inc. or dec. compared with Sept., 1937.
Eire	£41,556	— £5,240	*	—	*	—	*	—
Channel Islands	13,863	+ 1,945	*	—	*	—	*	—
Palestine	5,202	— 5,387	*	—	*	—	*	—
British West Africa	13,577	+ 522	*	—	*	—	*	—
Union of South Africa	149,190	— 46,866	£70,198	+ £59,161	£27,697	+ £8,795	£116,615	+ £12,739
British India	124,261	— 13,275	22,434	+ 11,105	12,605	— 1,681	41,077	+ 2,486
British Malaya	29,007	— 766	*	—	*	—	21,935	+ 15,941
Ceylon	14,290	+ 1,349	*	—	*	—	*	—
Hong Kong	12,527	+ 318	*	—	*	—	*	—
Australia	200,833	+ 24,621	6,709	— 51,640	21,066	+ 5,760	11,684	— 14,987
New Zealand	83,755	— 3,412	*	—	5,102	— 3,280	20,986	+ 7,700
Canada	13,218	— 3,463	4,088	+ 3,225	4,552	— 6,387	8,948	+ 2,034
Other British Countries	43,992	— 7,295	17,158	— 3,904	22,781	+ 8,506	38,892	+ 3,023
Sweden	15,869	— 2,083	*	—	*	—	*	—
Denmark	15,044	+ 1,227	*	—	*	—	*	—
Netherlands	16,107	+ 3,197	*	—	*	—	4,724	+ 2,572
Belgium	9,699	— 4,467	*	—	*	—	*	—
France	10,137	— 4,548	*	—	*	—	2,704	+ 825
Portugal	8,152	+ 696	*	—	*	—	*	—
Spain	4,192	— 3,600	*	—	*	—	*	—
Italy	4,395	+ 680	*	—	*	—	*	—
Greece	3,936	— 3,279	*	—	*	—	*	—
Rumania	7,688	— 16,612	*	—	*	—	*	—
Egypt	9,965	+ 3,300	*	—	*	—	648	— 1,194
China	6,626	+ 1,396	*	—	*	—	949	+ 949
Brazil	8,407	— 7,830	*	—	*	—	*	—
Argentina	31,459	— 11,219	*	—	*	—	3,167	+ 1,835
Other Foreign Countries	133,761	+ 32,644	30,795	+ 20,412	50,406	+ 10,025	51,486	+ 21,760
Total	£1,030,708	— £67,447	£151,382	+ £38,359	£144,209	+ £21,738	£323,815	+ £55,683

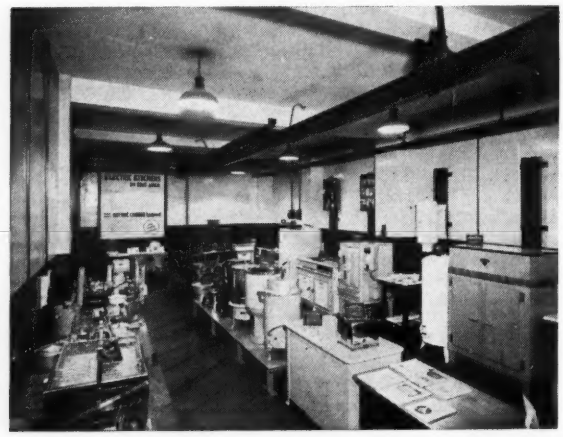
* Not classified separately. Vacuum cleaners are included in Table I but not in Table II.

Commercial and Industrial News

North London Exhibition. Electricity at a Fair. Extensions at Carlisle. Batti-Wallahs' Luncheon. Copper Restrictions Removed. Prospect of Electrical Legislation.

Exhibition of Canteen Electrical Equipment

ON Monday last the North-Eastern Electric Supply Co., Ltd., commenced an exhibition of canteen and commercial electric cooking equipment in the power demonstration room at Carliol House, Newcastle-on-Tyne. The display comprises a comprehensive range of apparatus and appliances for use in canteens totalling thirty-five pieces, including electric cookers, grills, hot cupboards, urns, vegetable boilers, fish fryers, potato cleaners and cutters, water heaters, toasters, refrigerators and dishwashers. This is the third exhibition of its kind held by the company, which informs us that as a direct result it has been successful in obtaining the provision of six large all-electric canteens at various works, &c., the total connections at which will amount to considerably more than 1,000 kW. In addition, many other outlets have been found for single pieces of cooking apparatus for minor applications. The exhibition will remain open until October 29th.



A display of canteen electrical equipment by the North-Eastern Electric Supply Co., Ltd., at Carliol House, Newcastle-on-Tyne

The Radiological Exhibition

The annual Radiological Congress and Exhibition will be held on December 7th, 8th and 9th at the Central Hall, Westminster. Additional accommodation has been reserved and the exhibition will be considerably larger than in the past. The nineteenth Mackenzie-Davidson memorial lecture will be given by Dr. G. Shearer and the twenty-first Silvanus Thompson memorial lecture by Dr. R. Ledoux-Lebard. The annual dinner will be held on December 9th at Claridge's Hotel, London, W.1.

The North London Exhibition

Until October 29th residents in North London will be able to see at an exhibition in their own area many of the latest developments in electrical equipment for the home. At the annual North London Exhibition now being held at Alexandra Palace the display in the "Northmet" pavilion is more comprehensive than ever, better spacing, combined with an attractive blue and yellow colour scheme, resulting in more effective presentation. Cookers, refrigerators, fires, vacuum cleaners, water heaters, laundry equipment, and small appliances each have their own separate sections, divided from the others by archways upon which appear such slogans as: "Health and happiness in your home with electricity at ½d. per unit." "Over 28,000 consumers cook by Northmet electricity—choose your cooker now" and "Perfectly simple—cook by electricity." Special prominence is given to water-heating conversion equipment, and to some of the more modern types of lighting fittings. A good deal of interest is being attracted by the new Bratt Colbran "Sunrise" fire, in which the imitation fuel itself actually becomes glowing hot. Elsewhere in the exhibition there are good displays of home laundry equipment on the stands of the Hurley Machine Co. (England), Ltd. ("Thor"); Beatty Bros., Ltd. and the British Vacuum Cleaner & Engineering Co., Ltd. The last-mentioned company also shows various "Goblin" vacuum cleaners, and there is a selection of Dizer machines on view. The "Rapid" water heater shown by Norton Modern Utilities is simply connected to the cold tap. The exhibition was officially opened by the High Commissioner for New Zealand, Mr. W. J. Jordan, at a luncheon presided over by the Mayor of Wood Green, Alderman A. J. Blue, on Wednesday last week. Proposing the toast of "The Electrical Industry," the Mayor of Southgate, Alderman G. B. Massa, said that the electrical trade had done more than any other to make the exhibition possible. Mr. C. J. Spenser, resident engineer of the Northmet Co., responded.

The entrance to the "Northmet" pavilion at the North London Exhibition now being held at Alexandra Palace and (below) a general view of the exhibits

Discharge-lamp Lighting

As an indication of the remarkable progress which has been made in street-lighting in this country the General Electric Co., Ltd., states that during the last five years it has supplied over 35,000 high-pressure mercury-vapour discharge lamps for the lighting of 700 miles of thoroughfares.

Copper Refining in Finland

The production of crude copper in Finland amounts to about 12,000 tons per annum. The State-owned company—the Outokumpu O.Y.—is about to erect a copper refining plant in Imatra and a copper-rolling mill near the Kumo river in the vicinity of the town of Pori. Here it is proposed to produce copper sheets and bars, and probably also copper conductors.

A Polish Inquiry

A Polish agency firm wishes to get in touch with an English manufacturer of insulating materials such as oiled linen strip, mica, micanite and varnish impregnated cloth. We shall be pleased to forward any letters addressed to this office.

Electricity at the Fair

In Hull they have found a new load, which, although of a temporary nature, is of sufficient dimensions to be well worth the expense involved. Once a year Hull is visited by a fair and during its week's stay its consumption of electricity for lighting and the many side shows reaches considerable proportions. Its visit this year was noteworthy by reason of the fact that the whole of the electricity supply was taken from the municipal electricity undertaking. This arrangement not only provides a valuable addition to the load of the undertaking, but, as the Deputy Lord Mayor (Ald. F. Holmes) stated at the opening of the fair, the introduction of a municipal supply made for safety.

Glasgow "Buys British"

Glasgow Corporation Sub-committee on Finance and Works on October 12th considered tenders for forty miles of trolley wire at a cost of £3,602. The lowest offer was £3,190, submitted by agents on behalf of a German concern, and the lowest British tender was by British Insulated Cables, Ltd., amounting to £3,602. The convener of the Transport Committee moved that the order should be given to the British

company and this was unanimously agreed to. The convener pointed out that the offer by the German firm worked out at 7¼d. per pound of wire and the cheapest British offer was 8⅞d. per pound. As the material was exclusively copper it was difficult to see how a German firm could make such a low quotation. Taking everything into consideration, and especially in view of the unsettled state of trade generally, both here and on the Continent, he thought it was advisable to place the contract in the hands of a British concern.

Signals for New London Electric Railway

The Siemens & General Electric Railway Signal Co., Ltd., has been given the contract by the London & North Eastern Railway Co. for the supply and installation of the whole of the new signalling equipment required at Liverpool Street station, and between that station and Bethnal Green. The scheme accepted is an all-electric installation with relay interlocking control, on the latest S.G.E. principle. There will be three control panels in a new signal cabin at Liverpool Street, and a fourth panel at Bethnal Green. Running signals will be long range, multi-unit type with internally lighted banner type signals for subsidiaries. S.G.E. blind type route indicators will again be used, and in addition to these there will be a number of five-light direction indicators. In view of the electrified lines which will form a part of the new station layout at Liverpool Street, there will be a number of impedance bond track circuits, incorporating the S.G.E. "Auto Bond." This is the third London terminal of the London & North Eastern Railway for which S.G.E. equipment has been chosen and that company entrusted with the installation work, the others being King's Cross and Fenchurch Street.

Registered Electrical Contractors

At the last meeting of the Executive Committee of the National Register of Electrical Installation Contractors applications for registration from the following were accepted:—

J. W. E. Simpson, Wollaston, Stourbridge.
Walkers (North Walsham), Ltd., North Walsham, Norfolk.
Stratford-on-Avon Electricity Co., Ltd., Halesowen.
Wisbech Electric Light & Power Co., Stowmarket.
Three Spires Electric, Ltd., Coventry.
Hampstead Electric Installations, 18, Englands Lane, Hampstead, London, N.W.3.
Henderson, David & Sons (Electricians), Ltd., Glasgow, C.4.
Springfield Electrical, Sparkhill, Birmingham.

At the same meeting two applications were declined.

A New B.I.F. Publication

Nearly a thousand exhibitors at the British Industries Fair in Birmingham display their products in such complete range that they need fifty pages of index in the official catalogue. This is one of the facts brought home in an illustrated brochure published this week. Camera studies reduce the vast single floor display of exhibits to an impressive and comprehensive pattern. Overseas buyers, as the brochure explains, are given every help. There are Fair inquiry kiosks at Euston and Paddington, and at New Street and Snow Hill stations, Birmingham. An interpreter meets all the principal trains at Birmingham and a special corps of interpreters, easily identified by their brassards, is available at the Fair building itself.

A Library Lighting Installation

Holophane, Ltd., has just completed a lighting installation with its new "built-in" system at the Edmonton Borough Library, North London. The lighting of the reading room is carried out by means of single panel dished "Controlens" units. The library section is lighted by three-panel fittings fixed to the ceiling around the edge of the laylight, and arranged so that the light distribution illuminates the bookshelves on each side of the unit. By using the "Controlens" fittings a high intensity is obtained on the books to enable the titles to be read easily, without having any local lighting. The scheme was designed by Holophane, Ltd., in conjunction with the Borough Engineer's Department and the North Metropolitan Electric Power Supply Co.

A view showing the lighting effects from Holophane built-in units at the Borough Library, Edmonton

Lift Orders

Marryat & Scott, Ltd., have received a contract for two electric passenger lifts and an electric goods lift for the police section house and married quarters at Tooting, and one electric passenger lift for the police section house at Paddenwick Road, Hammersmith.

Industrial Law Lectures

A course of six lectures on industrial law, including contracts of employment, the Truck Acts, the Factories Act, 1937, Employer's Liability and Workmen's Compensation Acts, National Health and Unemployment Insurance, and the law relating to welfare schemes, will be given at 14, Hobart Place, Westminster, S.W.1, on Wednesday evenings at 6.30 p.m. beginning on November 9th. The lecturer will be Mr. H. Samuels, M.A., Barrister-at-Law. The fee for the course of six lectures will be 30s., with a reduction to 21s. for members of the Industrial Welfare Society.

A Domestic Appliance Display

An attractive display for large windows which has been designed by Siemens Electric Lamps & Supplies, Ltd., gives opportunity for originality and variety. It has a background of primrose-tinted rays, for which an electric fire can form the suitable focus or central point, and four shelves, slipping easily into slots at different heights, enable a kettle, iron or other small appliance to be mounted without detracting from the balanced effect of the whole. The yellow rays deepen into a soft red border, and the name of the company stands out in bright red transparent lettering. The accompanying illustration shows the new display in a window of the Southwark Borough Council's electricity showrooms.

A domestic appliance window display designed by Siemens Electric Lamps & Supplies, Ltd.

Henley Employés and A.R.P.

At last week's board meeting of W. T. Henley's Telegraph Works Co., Ltd., it was reported that all those members of the staff and hourly paid workpeople who, during the recent crisis had been called up for duty, had returned to the company's service, and that all had received full pay for the period during which they were absent.

Australian Electrical News

Our Australian correspondent reports that Mr. P. Good, deputy director of the British Standards Institution, who is visiting Australia at the invitation of the Australian Standards Association to discuss the standards of quality and performance of materials and appliances, arrived in Sydney recently.

From a survey of a suburban area supplied by the Adelaide Electric Supply Co., Ltd., it was found that the number of electrical appliances per 100 consumers is approximately as follows: Irons, 85; radio sets, 80; electric jugs, 17.8; vacuum cleaners, 15.4; toasters, 12.2; radiators, 12; refrigerators, 3.5; small motors, 3; fans, 2.34; kettles, 1.9; washing machines, 1.4; clocks, 1.0; hair dryers 0.5. The total number of appliances per consumer is approximately 2.6, and the number of lamps per consumer 7.6. The area was 90 per cent. domestic.

To provide for extensions to the electricity supply at Suva, Fiji, the consulting engineers to the town board (Lincolne and Demaine, Melbourne) have accepted the tender of Siemens (Aust.) Pty., Ltd., for two English Electric alternators having a capacity of 200 kW each, at 0.75 power factor, directly coupled to English Electric 300-BHP six-cylinder heavy-oil engines running at 600 RPM. An English Electric motor generator of 100 kVA, having reversible characteristics, will be supplied. The total value of the contract is approximately £9,892 in Fijian currency.

A new workshop is to be built for the Brisbane City Council Electricity Supply Department at a cost of some £25,000. This building will replace the existing Victoria Park workshop.

With the coming of summer merchants are pushing a number of electrical lines, particularly refrigerators and vacuum cleaners, and it is noticeable that the latter are extensively advertised in all States. The recent European troubles made business dull in all parts of the Commonwealth, but the clearing up of this will no doubt bring conditions back to normal once more. Christmas displays are already being prepared.

Our Annual Domestic Number

The English Electric Co., Ltd., informs us that in referring to its domestic electrical products the company's address at Preston should have been given in the list of manufacturers' names, and not Stafford.

We regret that in the illustrations of lighting fittings on page 485 the captions relating to Nos 9 and 11 were transposed. Illustration No. 9 is a G.E.C. multi-unit fitting and No. 11 is a "Renown" multi-unit wood fitting.

The "Toastmaster" toaster referred to on page 508 is supplied by Frank V. Magrini, Ltd.; it is not a Gilbert product.

Trade Announcements

Vickers, Ltd., announce that the works and business of Vickers (Aviation), Ltd., and the Supermarine Aviation Works (Vickers), Ltd., are being taken over by Vickers-Armstrongs, Ltd.

The Demolition and Construction Co., Ltd., has removed to Neville House, Page Street, London, S.W.1 (telephone: Victoria 2288).

The telephone number of the Mond Nickel Co., Ltd., and Henry Wiggin & Co., Ltd., has been changed to Victoria 6868.

Price Reduction

Linealux, Ltd., announces the withdrawal of the 10 per cent. advance on all its manufactures (except fittings for the "Maxtrip 2" lamps). The new price list includes an aluminium section.

Synchro Time Systems, Ltd., the industrial branch of Smith's English Clocks, Ltd., announces that it will allow a 10 per cent. reduction on all quotations applied for up to the end of October.

Batti-wallahs' Luncheon

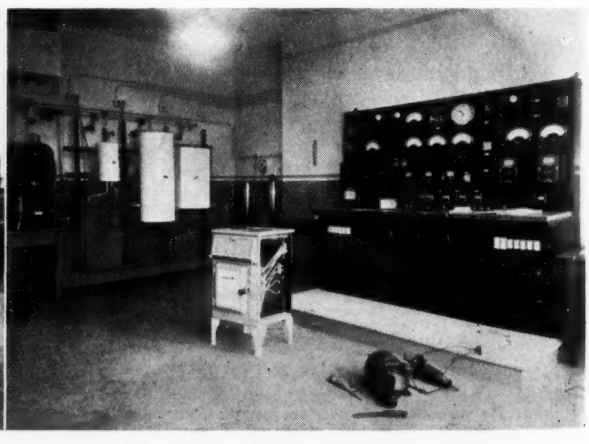
There was a large attendance, including eleven past presidents, at the first monthly luncheon of the Batti-Wallahs' Society for 1938-39. It was held as usual at the Hotel Victoria with Mr. R. H. Gummer, president, in the chair. The chief guest was Dr. W. Alfred Richardson, principal of Derby Technical College, and his address was concerned with sun-spot cycles and their diverse effects on the

Building Extensions at Carlisle

New distribution stores, meter-testing station and appliance workshops

ELECTRICAL development in Carlisle during the past few years has been very rapid, and the City Council's area of supply is now about 400 square miles. The electricity undertaking has been so developed that it can now supply a much larger area should the occasion arise. The latest extensions carried out at the power station, James Street, including new buildings consisting of distribution stores, meter-testing station, appliance workshops, &c., and these were formally inaugurated by the Mayor, Councillor J. W. Osborne, on October 13th. Following the opening ceremony a luncheon was held at the Crown and Mitre Hotel, which was attended by a large number of well-known engineers in the electricity supply industry. In proposing the toast of "The Guests," the Mayor said that those present included representatives of the Electricity Commissioners, the Central Electricity Board and the British Electrical Development Association. He felt that the additions to the undertaking were probably of more interest to E.D.A. than prior extensions such as the new generating station and the enlargement of the area of supply from four to 400 square miles. The setting up of workshops for reconditioning electrical appliances and the inauguration of a meter-testing station, with modern and improved tools and instruments, was designed to give confidence to the consumer. The approximate cost of the complete scheme was £35,000. Mr. A. C. Cramb, replying to the toast, said that he thought the new extensions had been well equipped and they would last for many years to come and give good service. He felt there was a tendency on the part of some municipal undertakings not quite to appreciate that when Parliament granted powers to supply electricity that also carried with it a responsibility to give people in their area the best service of electricity at the lowest possible price, and he believed it was because of that, to some extent, that Parliament had considered it necessary to review the whole position. Mr. Arnett (C.E.B.) proposed the toast of "The Electrical Development Association," and Mr. C. W. Salt, city electrical engineer and chairman of the Northern Counties Area of E.D.A., in responding, said that some of the improvements seen that day were really due to that Association as the result of the exchange of opinions. Mr. S. H. Richards (Electricity Commission) proposed the toast of "Carlisle Electricity Undertaking," and Mr. J. R. Potts (chairman of the Electricity Committee), in reply, said that Carlisle was the second largest distributing municipality in the kingdom. They had tackled the problems of meter testing, equipment stores and reconditioning so that if legislation was brought in whereby Carlisle should undertake to supply Cumberland and Westmorland they would be in the position of having facilities to do it.

The mains department of the new building has an efficient system of keeping records, and includes office accommodation for the mains superintendent, his assistant and district engineer, a drawing office, print room, and an office for mains and meter records. The consumers' department consists of workshops on the ground floor and offices on the first floor for the assistant consumers' engineer, the sales department, the publicity side of the undertaking, and the staff who deal with applications for electricity supply and general domestic appliances. In this department there is also accommodation for the chief inspector, installation inspectors, small appliances repair workshops, and a room for the testing of appliances prior to their dispatch to consumers. There is also a paint-spraying and stoving room and a fitting and erecting establishment for the heavier appliances such as cookers and motors. The meter-testing department includes stores for tested meters, meter-testing laboratory and meter repair workshops. There are also large general stores and garage accommodation for thirteen motor vehicles. The buildings are heated by hot-water radiators, the water being heated by two 400-W electrode boilers. The new buildings and equipment were planned by Mr. C. W. Salt, the city electrical engineer, with the assistance of his technical staff, including Mr. G. Wishart, who had charge of the design and construction of the buildings.



The new distribution stores, meter-testing station, appliance workshops, &c., of the Carlisle electricity undertaking, showing (left) the exterior and (right) one of the appliance workshops

weather and atmospheric conditions, which, in their turn, influenced life in most of its forms. Statistical observations appeared to indicate that very many periodic phenomena in nature were related to sun-spot growth and decay. The influence might be climatic and could be traced in plant growth, the strange habits of insects, certain kinds of fishes, some birds, a number of the smaller species of animals, smaller earthquakes and the rise and fall of African rivers and lakes. There seemed to be a pulsation of life on earth that was related to solar activity, which was perfectly regular and could be predicted. Economists refused to recognise any relationship between solar activity and cyclic industrial prosperity and trade depressions. They preferred to suggest that it was psychological for mankind to "go mad" periodically—but why every ten years? Anyway, these solar influences were universal phenomena and it should accordingly be realised that local efforts were quite useless to counteract effects that were world wide. Sir Geoffrey R. Clarke proposed the vote of thanks. The next luncheon will be on November 8th, when Vice-Admiral Gordon Campbell will address the gathering.

Copper Restriction Removed

The *Financial Times* reports that copper producers subscribing to the regulation scheme (Rhodesia, Chile and the Belgian Congo) decided on October 17th to remove as from October 15th all restriction "for whatever period is considered advisable." This decision revises that announced a week ago when it was intended to increase the monthly output by about 6,000 tons by enlarging the quota 10 per cent. to 105 per cent. of the basic tonnages as from last Saturday.

National Coal Convention

The fourth National Coal Convention, organised by the Coal Utilisation Council, which was postponed owing to the international crisis, is to be held at the Wharncliffe Rooms Hotel, Great Central, London, on November 23rd and 24th. The chair at the inaugural luncheon will be taken by Sir Evan Williams, President of the Council, and on the evening of November 24th there will be a dinner and ball, at which Lord and Lady Gainford will be the host and hostess.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price October 19th.	Fortnight's inc. or dec.
a Acid Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£37	—
a Ammonia, Muriate (large crystal) ... ,,	£18 10s.	—
a Borax... ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¾d.	—
a ,, Perchlorate... ... ... ,,	6d.	—
a Shellac ... ... per cwt.	£4 8s.	—
a Sulphur, Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda, Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium, Bichromate, casks ... per lb.	4¼d. net.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£94	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ,,	1/2½ to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£181	—
Grade II ... ... ,,	£127	—
Grade III ... ... ,,	£70	—
c Brass (rolled metal 2" to 12" basis)... per lb.	8¼d.	¼d. inc.
c ,, Tubes (solid drawn) ... ... ,,	1/– to 1/0¼d.	¼d. inc.
c ,, Wire, basis ... ... ,,	8¼d.	¼d. inc.
c Copper Tubes (solid drawn) ... ,,	1/1¼d.	¼d. inc.
g ,, Bars (best selected) ... per ton	£84	£4 inc.
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£54	£5 10s. inc.
d ,, ,, Wire Rods ... ,,	£58 15s.	£5 10s. inc.
d ,, ,, H.C. Wire ... per lb.	8¾d.	⅛d. inc.
f Ebonite Rod ¼" dia. & up. ... ... ,,	1/10 to 2/5	—
f ,, Sheet ⅛" thick & up ... ... ,,	1/5 to 1/10	—
n German Silver Wire, Nos. 1 to 12 ... ,,	2/4	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para-fine ... ... ,,	8d.	¼d. inc.
i Iron, Pig (Cleveland, No. 3) ... per ton	£4 5s.	—
i ,, Wire galv. No. 1 P.O. Qual. ... ,,	£23	—
g Lead, English Pig ... ... ,,	£18 10s.	£1 5s. inc.
g Mercury ... ... per bot.	£14	10s. inc.
e Mica (in original cases) small ... per lb.	10d. to 2/–	—
e ,, ,, ,, medium ... ,,	6/- to 12/6	—
e ,, ,, ,, large ... ,,	13/- to 17/6 up	—
p Phosphor Bronze, plain castings ... ,,	1/2½	—
p ,, ,, drawn bars & rods ,,	1/1¼d.	¼d. inc.
p ,, ,, rolled strip & sheet ,,	11⅞d.	¼d. inc.
p ,, ,, wire ... ... ,,	1s. 1¾d.	¼d. inc.
o Platinum ... ... per oz.	£8	—
d Silicium Bronze Wire ... ... per lb.	9¼d.	—
g Spelter ... ... per ton	£15 8s. 9d.	£1 6s. 3d. inc.
g Tin, Block (English) ... ... ,,	£207	£10 15s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/6	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in our "Business Notes" under the same heading.

Electrical Legislation

Alderman Sir Percival Bower, chairman of the Electric Supply Committee of the Birmingham City Council, speaking at a luncheon meeting of the Birmingham Circle of the Electrical Development Association on October 12th, referred to the good understanding which existed in the area among those concerned with electrical development. Progress made during the past few years had been very satisfactory and he entertained the hope that political considerations would not be allowed to influence electrical development in any direction. The position of uncertainty which had existed since the McGowan Report was published was not good for the industry, and he felt that the time had arrived when they should know whether they were to be allowed to go on undisturbed or whether they were to be subjected to further legislation. He was satisfied, however, that further reorganisation was necessary. Having established standard frequency, the other matters of standard system and voltage must be tackled, while administrative changes in regard to the areas of supply might also be considered, with beneficial results. They must put their own house in order, and encourage the use of electrical appliances. It was a great tribute that, in spite of increasing costs, they had been able, over a series of years, to effect substantial reductions in the tariff charges. The chairman (Mr. J. W. Mayall) stated that no effort had been spared by the Birmingham Circle to find an outlet for the growing output of electricity, and Mr. F. Forrest, the city electrical engineer, referred with satisfaction to the continued growth of the Corporation undertaking. Dr. Anderson, Principal of the Birmingham Central Technical College, pointed out that electricity in the home was reducing household drudgery to the minimum. Mr. Wardle, chairman of the Central England Area of the Association, also spoke.

Liability for Injuries

In the King's Bench Division on October 13th Mr. Justice Lawrence reserved judgment in the case of Fowler *v.* Yorkshire Electric Power Co., Ltd., on a question of law which he had reserved for consideration in London after the trial before him and a special jury at the Leeds Assizes in July last.

The plaintiff, Mr. R. W. Fowler, a plumber, of Dewsbury, brought the action against the defendant company to recover compensation for serious personal injuries sustained through the alleged negligence and breach of statutory duty of the defendants, their servants or agents.

In October, 1936, Mr. Fowler was working for Frank Newsome, Ltd., his employers being engaged in doing certain work at the defendants' Dewsbury power station. While at work he was struck by an electric travelling crane belonging to the defendants and sustained injuries which resulted in the complete loss of his right hand and head injuries. Mr. Fowler alleged that the defendants were liable *inter alia* in failing to warn him of the danger, in failing to warn the driver of the crane of the work the plaintiff was then doing and his presence there, and in failing to stop the crane.

The defendant company denied liability alleging that the Mitchell Engineering Co., Ltd., was employed by them to do the work and that the company had sub-contracted the part of work on which Fowler was engaged. In the circumstances which had happened they denied being liable, denied having been guilty of breach of any statutory duty, and further pleaded that the plaintiff had been guilty of contributory negligence.

The jury at the trial assessed the damages to which the plaintiff was entitled if defendants were liable at £1,250, but found that although a danger existed there was no negligence on the part of the defendants. The question of law now argued on the findings of the jury was whether the defendants were responsible for the failure of Newsomes to pass on the danger warning to the plaintiff. As before stated, His Lordship reserved his judgment.

Change of Name

Mouldrite, Ltd., an associated company of Imperial Chemical Industries, Ltd., is now to be known as I.C.I. (Plastics), Ltd. This step has been taken to bring the Plastics Group of I.C.I. into line with other manufacturing groups such as I.C.I. Metals, Ltd., I.C.I. (Lime), Ltd., &c. Mouldrite products include moulding powders, syrups, glues, resins, &c., of the phenolic and urea formaldehyde types, and the acrylic esters "Diakon" and "Perspex."

Repairs by Welding

A lecture, illustrated by about sixty lantern slides, prepared by Barimar, Ltd., describes repairs that have been carried out by scientific welding processes. The pictures show industrial machinery, and motor and motor-cycle parts that have been repaired, as well as metal articles of historic and domestic interest. The slides, with complete manuscript for lecture, are available on loan, without charge, to technical schools and colleges, motoring clubs, engineering societies and similar institutions. Requests for the slides and lecture should be sent to the company at 14/18, Lamb's Conduit Street, London, W.C.1.

Furnace Electrodes

Studies which have been carried out in Germany on the comparative merits of electrodes indicate that carbon electrodes made from coke obtained from high quality anthracite burn up about twice as rapidly as graphite electrodes, use about 2.5 per cent. more current, and take a little longer to

melt a given mass of metal. From a purely electrical standpoint, therefore, graphite would seem to be markedly better than carbon. The difference is not sufficient, however, to permit graphite to be used economically, as its cost is about 3.6 times that of carbon.

The Medical Exhibition

The large extent to which electricity is now being used by the medical profession is probably not properly appreciated by the man-in-the-street. There are few doctors to-day who do not at least have their own ultra-violet ray and radiant heat equipment, while many hospitals are using perhaps three or four times as much electricity as was normal a few years ago. At the London Medical Exhibition now open (to the medical profession only) at the Royal Horticultural Hall, Westminster, some of the more recently produced electrical aids include electrical ophthalmoscopes; a stethoscope with an electrical amplifier; and what is styled "the passive vascular exerciser," a device for treating such ailments as frostbite, gangrene and chilblains by producing, by means of a compressor, an alternative suction and pressure massage effect. Another new development is the purification of water by applying the bactericidal qualities of ultra-violet radiation. The "Uster" type Hanovia steriliser used incorporates a 700-W high-pressure tube, mounted in a cylindrical quartz jacket. A trolley-mounted ultra-violet ray lamp for ward use is another recent Hanovia product.

An Apprenticeship Scheme

The Electro Dynamic Construction Co., Ltd., is now in a position to accept premium apprentices for two- or three-year terms. Particulars of the scheme are given in our advertisement pages to-day.

Felixstowe Electrical Exhibition

The Felixstowe Urban District Council is holding an electrical exhibition at the Pier Pavilion, from October 24th to October 29th. The Electricity Department, local contractors and a number of manufacturers are exhibiting.

New Catalogues and Lists

R. Cadisch & Sons, Red Lion Square, London, W.C.1.—A wholesale radio catalogue.

Service Electric Co., Ltd., 122, Pratt Street, London, N.W.1.—Details of fire and A.R.P. alarm signals.

Harcourts, Ltd., 1, Kean Street, Aldwych, London, W.C.2.—A folder illustrating the "Teleflexo" combined telephone and desk lamp.

Brookhirst Switchgear, Ltd., Northgate Works, Chester, has produced an illustrated art book, bound in a stiff cover, dealing with the electric control of ships' auxiliaries.

Electric Art Shades (1928), Ltd., Feering Factory, Kelvedon, Essex.—A catalogue of bedlights.

J. G. Statter & Co., Ltd., 82, Victoria Street, London, S.W.1.—New publications illustrating typical examples of Statter switchgear and describing and illustrating extra-high-voltage metal-clad vertical draw-out, oil and compound-filled switchgear.

Bulpitt & Sons, Ltd., Swansea Works, Birmingham, 1.—A Christmas gifts folder.

Sloan Electrical Co., Ltd., 54/55, Fetter Lane, London, E.C.4.—A complete 60-page illustrated catalogue of electric fires.

Lightfoot Refrigeration Co., Ltd., Abbeydale Works, North Circular Road, Wembley.—Illustrated literature dealing with dairy and ice-cream equipment.

Ever-Ready Co. (Great Britain), Ltd., Hercules Place, London, N.7.—A copy of the retailer's reference catalogue for batteries, bulbs, lamps and radio sets.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—A folder price list of car bulbs.

H. J. Scott & Co., Ltd., Volt Works, Ravenhill Avenue, Belfast.—A stock list of electric motors.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Lists dealing with dividing boxes, plugs for charging electric vehicles, sealing bells, joint-box transformers and a technical treatise on the selection of protective systems for feeders, transformers, generators, reactors and bus-bars, Holmes variable speed AC motors and high breaking capacity fuses.

Sperryn & Co., Moorsom Street Works, Birmingham, 6.—Details of a new type of heavy-duty lampholder.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, London, E.C.1.—A catalogue of underground disconnecting boxes.

Forward Electric Co., Ltd., Kingstanding Road, Perry Barr, Birmingham, 20.—A catalogue of lighting fittings, including many fine full-page art illustrations.

Aerialite, Ltd., Castle Works, Stalybridge, Ches.—An illustrated leaflet dealing with a householder's air raid precautions kit, including medicaments and an electric torch.

Bankruptcy Proceedings

J. J. Scott, 3, Clifton Street, Lytham, wireless and electrical engineer.—At the public examination held recently at the Court House, South King Street, Blackpool, it was stated that there were ranking liabilities of £467 and there was a deficiency of £406. Debtor attributed his failure to shortage of capital, keen competition and decline in trade. The examination was closed.

G. S. Newlove, electrical contractor, 74, Crosby Avenue, and late 42, Dale Street, both at Scunthorpe, Lincs.—Receiving order made October 6th on debtor's own petition. Public examination November 3rd at the Town Hall, Great Grimsby.

A. A. Glossop, radio service engineer and radio dealer, 33, Parkhead Crescent, Eccleshall, Sheffield, lately carrying on business at 7 and 12, Norfolk Market Hall, Sheffield.—Receiving order made October 6th on debtor's own petition.

M. R. Horne (Malcolm & Stewart), wireless and electrical retailer, 491, Alum Rock Road, Birmingham.—Public examination January 11th at the Court House, Birmingham.

C. G. Merrison, radio dealer, 61B, Raleigh Street, Walsall.—First and final dividend of 2s. 3¾d. in the £, payable October 19th at 159, Great Charles Street, Birmingham.

S. R. Phipps, electrical engineer, Alcester Road, Studley, Warwickshire.—Receiving order made October 12th on debtor's own petition.

Company Liquidations

Coulphone Radio Mfg. Co., Ltd.—Winding up voluntarily. Liquidator, Mr. S. R. Aldrich, 2, Chapel Street, Preston.

Eves Radio, Ltd.—Meetings October 31st at Berrington Chambers, 93, Tettenhall Road, Wolverhampton, to receive an account of the winding-up by the liquidator, Mr. E. Cox.

George Heritage Smart, Ltd.—Particulars of claims to the liquidator, Mr. T. J. Prentice, 10, Queen's Road, Coventry, by November 10th. This notice is purely formal as all creditors have been, or will be, paid in full.

Electrical Equipment (Hove), Ltd.—Meetings November 11th at 6-7, Old Steine, Brighton, to receive an account of the winding-up by the liquidator, Mr. A. E. Orbell.

Electric Control, Ltd.—Meeting November 15th at the offices of Allen West & Co., Ltd., Brighton, to receive an account of the winding-up by the liquidator, Mr. C. A. Worssam.

Dissolution of Partnership

H. Stansfield & Co., radio and electrical engineers, Station Road, Ossett.—Messrs. O. Fox and H. Stansfield have dissolved partnership. Mr. Fox will attend to debts in respect of radio goods, apparatus or appliances, and Mr. Stansfield will attend to debts in respect of electrical goods, apparatus or appliances. Mr. Stansfield will carry on business as electrical engineer on his own account at Station Road, Ossett.

Forthcoming Events

Institution of Electrical Engineers.—Monday, October 24th. Institution, London, W.C.2. 7 p.m. Informal meeting. Discussion on "Engineering Training," to be opened by the President.

North-Eastern Centre.—Monday, October 24th. The Newe House, Pilgrim Street, Newcastle-on-Tyne. 6.15 p.m. Chairman's address by Mr. F. A. Orchard.

North Midland Centre.—Tuesday, October 25th. Hotel Metropole, Leeds. 7 p.m. "Safeguards against Interruptions of Supply," by Messrs. H. W. Clothier, B. H. Leeson and H. Leyburn.

Scottish Centre.—Tuesday, October 25th. North British Station Hotel, Edinburgh. 7 p.m. "Line Protection by Petersen Coils," by Mr. H. Willott Taylor and Dr. P. F. Stritzl.

East Midland Sub-Centre.—Tuesday, October 25th. The College, Loughborough. 6.45 p.m. "Recent Progress in Power Rectifiers and their Applications," by Mr. W. G. Thompson.

Irish Centre.—Thursday, October 27th. Trinity College, Dublin. 6 p.m. Chairman's address by Mr. J. W. O'Neill.

Birmingham Electric Club.—Monday, October 24th. Grand Hotel. 7 p.m. "Electrical Drives in Heavy Industries," by Mr. H. S. Carnegie.

Illuminating Engineering Society (*Decorative Lighting Section*).—Tuesday, October 25th. G.E.C. Lecture Theatre, Kingsway, W.C.2. 7 p.m. Discussion on "What is the Trend of Decorative Lighting and Is It Desirable?", to be opened by Mr. A. B. Read.

Commercial Lighting Section.—Thursday, October 27th. 2, Savoy Hill, W.C.2. 7 p.m. "Commercial Lighting Practice in the United States," by Mr. H. Lingard.

Society of Model Engineers.—Tuesday, October 25th. Caxton Hall, Westminster, S.W.1. 7 p.m. "The Importance of Lubrication in Small Mechanisms," by Mr. E. A. Smith.

Institute of Metals.—Wednesday, October 26th. Hobart House, Wilton Street, S.W.1. 7.30 p.m. "Electron Diffraction and Surface Wear," by Prof. G. I. Finch.

Iron and Steel Institute.—Wednesday, October 26th. Institution of Civil Engineers, Great George Street, Westminster. 10 a.m. and 2.30 p.m. Autumn meeting.

Association of Mining Electrical Engineers (*Yorkshire South-East Branch*).—Wednesday, October 26th. Rotherham. Discussion on Report of H.M. Electrical Inspector of Mines, 1937, and Mines and Quarries Form 11, by Mr. J. A. B. Horsley.

Lothians Branch.—Saturday, October 29th. "Research in the Development of Flameproof Electrical Enclosures," by Dr. C. S. W. Grice.

Physical Society.—Friday, October 28th. Imperial College of Science and Technology, South Kensington, S.W.7. 5.15 p.m. Short papers.

Junior Institution of Engineers.—Friday, October 28th, 39, Victoria Street, S.W.1. 7.30 p.m. Informal meeting. Discussion on "The Status, Qualifications and Remuneration of the Engineer," to be opened by Dr. H. Chatley.

Faraday House Old Students' Association.—Friday, October 28th. Savoy Hotel, W.C. 7 p.m. Annual dinner.

Institute of Vitreous Enamellers.—Friday, October 28th, to Sunday, October 30th. Hotel Normandie, Knightsbridge, London. Annual conference.

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

H.T.P. batten-type lampholders.

Electricity Supply

Lighting, Domestic, Power

Aylesbury.—NEW TRANSMISSION LINE.—The Borough Council has obtained permission to borrow £5,100 for the erection of a 33-kV overhead transmission line from Aylesbury to Chinnor, a distance of 10 miles. The line will serve the Chinnor Cement & Lime Co.'s works and feed the existing extra-high-voltage ring main transmission lines.

Birkenhead.—YEAR'S SURVEY.—The Electricity Department, whose area covers the greater part of the Wirral peninsula, sold during the past year 119.8 million kWh, of which 50.0 million kWh was supplied in bulk to Lever Bros. Excluding this bulk supply there was an increase of 14 per cent. in electricity sold. Apart from traction supplies, which increased from 1.0 to 3.1 million kWh, the greatest proportionate expansion was under the domestic tariff (17 per cent.). The net increase in electric cookers connected was again very satisfactory (1,180 against 1,174 in the previous year), and the total of 8,365 at the end of March was equivalent to one for every 6.4 houses in the area. It is also interesting to note that for the fourth occasion in five years the peak load has occurred at breakfast time, which Mr. F. E. Spencer, the borough electrical engineer, considers reflects the continuous steady development of the domestic load, particularly for cooking and heating. The number of consumers rose during the year by 2,009 to 49,321, making the proportion of consumers to total premises 84.3 per cent. The fact that the number of new installations connected under the assisted wiring scheme fell last year is stated to indicate that the limit of the scheme is being reached. At present it is practically restricted to five lighting points, with a plug point for radio or an electric iron, and the engineer states that consideration will have to be given to enlarging its scope or the introduction of another scheme for encouraging the extended use of electricity for heating, cooking, cleaning, &c. Considerable progress in the use of electricity for street lighting is reported, 495 new lamps having been put into commission during the year ended March 31st last.

A typical sub-station in a residential district of Birkenhead

Blackpool.—CONTINENTAL VISITORS TO THE ILLUMINATIONS.—Lighting experts from Germany, Holland and other European countries visited Blackpool on October 15th to view the illuminations. They included Messrs. R. Talhaber (Geneva), B. Seeger and L. Schnieder (Berlin), Dr. A. W. Geiss and Mr. L. Kalss (Holland), and Mr. P. Pillitz (Hungary). Other visitors included Mr. W. J. Jones, of the Lighting Service Bureau.

Bradford.—UNDERTAKING'S JUBILEE.—The municipal electricity undertaking will next year celebrate its golden jubilee. It was the first supply undertaking owned by a local authority to be established in this country, a public supply being commenced in September, 1889.

Burton-on-Trent.—STREET LIGHTING.—Three members from each of the gas, electricity, and public works committees have been appointed to consider new arrangements for street lighting in the town.

SUB-STATION.—The Electricity Committee is to provide an additional sub-station in the Mosley Street district at a cost of £800.

Caerwent.—SUPPLY SCHEME.—The West Gloucestershire Power Co. has decided to proceed with extensions in order to make a supply of electricity available in the area.

Darlington.—DISTRIBUTION EXTENSIONS.—Mains extensions are to be carried out by the Electricity Department in High Northgate, North Road and Greenland Road, while cables are also to be laid for supplying electricity to Neasham and Low Coniscliffe.

AIR RAID PROTECTION.—Subject to the approval of the Electricity Commissioners, the Town Council is to spend £4,700 on protection for the electricity works during air raids.

Eston.—ELECTRIC COOKING IN SCHOOLS.—At a recent meeting of the Electricity Committee it was reported that the North Riding Education Committee had written with reference to the provision of domestic electrical equipment in senior elementary schools in the urban district. It was agreed to reply that such equipment would be provided free of charge where the schools had a domestic science centre, if the county education authority would pay for all electricity consumed at 1d. per kWh.

Fareham.—ELECTRICITY CHARGES.—Last week the Urban District Council referred back to the Lighting Committee a recommendation to increase the "unit" charges under the domestic and maximum demand tariffs to ¾d., with the suggestion that the Committee should consider charges of ½d. in the summer and ¾d. in the winter.

Great Yarmouth.—REDUCED CHARGES.—The flat rate for lighting is to be reduced from 4½d. to 4d. per kWh to consumers within the borough, and from 6d. to 5½d. to consumers in rural areas. It is expected that this concession will cost about £6,000 per annum.

AUTOMATIC STREET LIGHTING.—The Electricity Committee has approved a recommendation of the electrical engineer for the operation of the first section of 250 lamps, at a cost of £200, before submitting a complete scheme for the automatic control of street lighting.

Grimsby.—SUB-STATION.—A site for an additional sub-station has been chosen near Hereford Avenue.

Hamilton.—REMOVAL OF BAN URGED.—Some time ago the Council passed a resolution precluding occupiers of houses on municipal estates from using electricity for heating or cooking. At a recent meeting of the Council the matter was again raised, the convener of the Electricity Committee stating that the resolution was hindering the progress of his department. He said it was difficult to justify a resolution that deprived tenants of the right to choose which form of power they desired to use for any purpose. It was decided to refer the matter for consideration by a joint committee of the Gas and Electricity Committees.

Hove.—SUPPLY TO FLATS.—A supply of electricity is to be given to 54 flats which are being erected in Grand Avenue. The cost will be £1,530.

Inverness.—PLANT EXTENSIONS OR BULK SUPPLY?—When Mr. D. J. Colville, Secretary of State for Scotland, conferred with local authorities in Inverness last week the proposed extension of the Corporation electricity works was discussed. Provost Hugh Mackenzie explained that they were being pressed by the Electricity Commissioners to take a partial bulk supply from the Grampian Electricity Supply Co. It was contended that the company's charges for the partial supply were higher than those at which the burgh could produce electricity if its own plant were extended. A suggested solution was that the charges of the supply company should be lowered.

Isle of Man.—REGISTRATION OF WIREMEN DISCUSSED.—When, in the Tynwald Court recently, the Attorney-General moved the approval of the Electricity Supply Regulations, 1938, which are designed to secure the safety of the public and ensure a proper and sufficient supply of electrical energy, Mr. A. Teare said that these regulations seemed to deal only with suppliers. There were regulations requiring that persons doing plumbing of water mains should be qualified, and he thought that something of this nature was imperative for electric wiring. There was no registration, and there was a very serious risk to the public. Mr. Corrin said that the Electricity Board would welcome a scheme of this sort, if a workable one could be devised. It had to suffer a great deal of criticism and sometimes financial loss on account of the faulty workmanship of contractors. Mr. Crellin asked whether the chairman of the Electricity Board would undertake to prepare regulations to be submitted to the Court, but the Speaker observed that this was surely a matter for the Government.

Lichfield.—RURAL SUPPLIES.—The Electricity Committee is considering a request from the Alrewas Parish Council that a supply of electricity should now be afforded to Fradley Junction and Alrewas Hayes.

FRINGE ORDER.—Sanction has been obtained to a Fringe Order to supply certain premises at Hilton.

Liverpool.—LOAN.—The Electric Power and Lighting Committee is to apply for permission to borrow a sum not exceeding £300,000 for prospective extensions of underground and overhead mains.

Lowestoft.—AIR RAID PRECAUTIONS.—The Electricity Committee is to provide air raid precautions at a cost of £5,800.

The Minister of Transport has consented to the erection of overhead lines by the Town Council in Lowestoft and Lothingland, subject to the right being reserved to review the consent after the expiration of five years.

Margate.—STREET LIGHTING.—A new scheme of street lighting is proposed for the sea-front from Northumberland Avenue to the junction of Canterbury Road and All Saints Avenue. The Council is to obtain quotations from the Isle of Thanet Electric Supply Co., Ltd., and the Isle of Thanet Gas Light & Coke Co. It has accepted the tender of the Isle of Thanet Electric Supply Co., Ltd., for the lighting of part of Nash Road and St. James Park Road.

Melton Mowbray.—REDUCED TARIFF.—As from the September meter readings the running charge under the domestic two-part tariff rate of the Melton Mowbray Electric Light Co., Ltd., is being reduced to ¾d., with a lower annual fixed charge based on floor area. The annual fixed charge for business premises has also been reduced from £13 to £12 per kW.

Merriott (Somerset).—STREET LIGHTING SCHEME.—The Parish Council has decided to introduce public lighting, and the tender of the South Somerset Electricity Co. for twenty-two street lamps has been accepted.

Middlesbrough.—LOAN.—Application is being made by the Town Council for permission to borrow £5,000 for mains and sub-station equipment.

Morecambe.—10,000TH CONSUMER CONNECTED.—The Electricity Department has just connected up its 10,000th consumer, and at a celebratory presentation at the electricity showrooms on October 13th Councillor W. Gardner congratulated Mr. H. Hornsey on being the lucky person. The borough electrical engineer, Mr. P. Clegg, said they were gratified at obtaining the 10,000th consumer, but they would like to sell the 10,000th cooker. They had reached 3,000, which was a high percentage.

Plymouth.—POWER STATION EXTENSION.—The Town Clerk has submitted to the Electricity Committee a direction issued by the Central Electricity Board for the extension of the Prince Rock generating station, at an estimated cost of £226,980, to be ready for commercial operation in September, 1940.

METERS.—Application is being made for permission to borrow £100,000 for mains and services and £20,000 for meters.

Portsmouth.—SETTLEMENT WITH C.E.B.—The electrical engineer reports that after considerable negotiations the Central Electricity Board has agreed to accept £198,513 in settlement of the account for the year 1937 in place of the tariff figure, which would have amounted to £292,897.

The restoration of Staples Inn, Holborn, which has been proceeding for three years, has now been completed. The ancient buildings make an impressive picture when floodlighted at night, as shown in the accompanying illustration

Richmond (Yorkshire).—The North-Eastern Electric Supply Co., Ltd., has agreed to formulate a scheme for an alternative electricity supply for the town. This will increase the supply to Catterick Camp and the existing line from the camp to Richmond will be used as a standby.

Shenley (Herts).—STREET LAMPS.—The Parish Council has accepted the estimate of the "Northmet" company for the erection of six lamps on Black Lion Hill.

South Shields.—TRADING ANALYSIS.—Accompanying the past year's report of the borough electrical engineer (Mr. N. T. Smith) are a number of interesting diagrams showing the proportion of the various classes of consumption, revenue and expenditure to the whole. Sales last year (19.3 million kWh) are shown in the following percentages: power, 33.3; traction, 13.9; flat rate, 11.2; rateable value, 7.6; heating, 7.3; prepayment (assisted wiring), 7.3; maximum demand, 6.2; public lighting, 5.0; prepayment (private installations), 4.5; cinemas, 2.0; and miscellaneous, 1.7. Revenue (£147,436) was divided as follows: flat rate, 20.9; prepayment (assisted wiring), 18.9; power, 18.8; prepayment (private installations), 7.1; maximum demand, 7.0; traction, 6.9; rateable value, 5.7; public lighting, 4.8; heating, 3.8; cinemas, 2.2; meter rents, 2.2; special charges, 1.0; and miscellaneous, 0.7. Expenditure (£93,596) is analysed as follows: cost of energy, 53.2; management, 17.2; rates, 9.6; distribution, 9.4; taxes, 4.3; maintenance and repairs, 3.4; and public lamps, 2.9. There was a net profit of £5,901 on the year's working. Compared with the previous year the kWh sold show an increase of 19 per cent.—considerably higher than the average for the country.

Stockton-on-Tees.—SUB-STATION.—The Town Council proposes to erect a sub-station in Church Road.

Sunderland.—ILLUMINATIONS.—The number of people who attended the annual illuminations organised at Roker by the Town Council was 320,688, and the receipts amounted to £7,414, a decrease of 146,179 people and £3,373 compared with last year. The international crisis coupled with bad weather are blamed for the falling-off, but the results are still declared to be satisfactory.

Swansea.—PROPOSED CHANGES AT TIR JOHN.—The Borough Council is recommended to instruct Mr. John Bruce, the consulting combustion engineer who has reported on the Tir John power station, to prepare the necessary plans and specifications for abolishing the existing sulphur and dust extraction plant at the station and to construct in substitution therefor electrostatic precipitator plant for the elimination of dust and grit, together with the necessary ducting and connections at an estimated cost of £60,000 to £80,000; also to construct in connection with the electrostatic precipitator plant two new chimneys 300 ft. high at an estimated cost of £24,000 to £30,000. Mr. Bruce, it is stated, is prepared to carry out the work at a similar fee to that provided for in the existing agreement between him and the Corporation. The Council is also to be asked to apply to the Electricity Commissioners for sanction to borrow the necessary moneys involved. The special committee recommends that the sum of £3,260 shall be paid in full settlement of the claim of £5,866 by James Howden (Land), Ltd., the contractors for the sulphur and dust extraction plant, for extras arising out of the contract.

Swinton and Pendlebury.—SUB-STATION.—The Electricity Department is to erect a sub-station on a site in Victoria Park.

Tynemouth.—SUB-STATION.—The Town Council proposes to build a sub-station on the Chirton Hill estate.

Wales.—WAYLEAVE DIFFICULTIES.—Owing to difficulties experienced in obtaining wayleaves for transmission lines the North Wales and South Cheshire Joint Electricity Authority last week decided to ask the Electricity Commissioners to introduce legislation to facilitate such work, and it was also agreed to seek the support of the Conjoint Conference of Public Utility Undertakings.

SUPPLY MATTERS.—At the same meeting the North Wales Power Co. reported that arrangements had been made for the acquisition by the company of the Bettws-y-Coed Council's undertaking. Ald. R. F. Hamer, of Llanidloes, complained of the unsatisfactory position in his district where, he said, there was no adequate supply of power available, so that industrial development was retarded in an area where unemployment was rife. Mr. G. K. Paton, of the North Wales Power Co., said that his company had made what it considered was a most generous offer to the local company for its rights as suppliers, but the negotiations had been unsuccessful. It was agreed to investigate the matter with a view to bringing about a satisfactory settlement. The Menai Bridge Council wrote stating that no decision had yet been reached with regard to the supply to Llandegfan, Anglesey, but a definite proposal was expected shortly. In view of the prolonged delay it was decided to approach the Electricity Commissioners in the matter.

Walkern (Herts).—PUBLIC LIGHTING INAUGURATED.—Another step forward in the provision of public lighting in Hertfordshire rural areas was taken last week when a switching on ceremony took place at Walkern. The supply is taken from the "Northmet" company.

Warrington.—MAINS AND SERVICES.—The Electricity Committee is seeking sanction to borrow £20,000 for mains and services.

Overseas

Eire.—COMPENSATION CONSIDERED INADEQUATE.—A meeting of farmers of Blessington, Lacken and Valleymount recently passed a resolution in which they "viewed with alarm the inadequate compensation offered by the Electricity Supply Board for the loss of lands acquired for the Liffey scheme."

France.—POWER FACTOR OBLIGATION.—A recent decree of the Ministry of Public Works provides that electricity companies need not supply industrial plants in which the power factor is too low. Under the terms of this decree the power factor is to be determined for each installation during a period of ten minutes chosen at the time of the day when the consumer is using his greatest load under normal operating conditions. If this power factor is less than 0.50 for contract loads up to 50 kW, 0.55 up to 100 kW, 0.60 up to 1,000 kW or 0.65 above 1,000 kW the distribution company is not obliged to continue the supply.

Northern Ireland.—GENERATION OF ELECTRICITY.—An official return furnished by the Ministry of Commerce shows that 50.5 million kWh was generated by authorised undertakings in Northern Ireland during the quarter ended September 30th, as compared with 46.7 million kWh in the corresponding quarter in 1937, representing an increase of 3.8 million kWh, or 8.2 per cent. The total energy generated during the first nine months of 1938 was 171.2 million kWh, compared with 161.1 million kWh in the corresponding period of 1937, an increase of 10.1 million kWh, or 6.2 per cent.

Turkey.—TWO NEW POWER PLANTS.—The Turkish Electricity Administration created three years ago to hasten the electrification of the country has decided on the construction of two new thermal plants both of which will be built in mining centres. The first, at Tchatalagzi, within easy reach of the Zongouldak coal mines, will have a capacity of 45,000 kW. It will be capable of producing 100 million kWh annually. The power will be used for improving the operation of the coal mines and to electrify the railway lines in the district. The second plant, at Kutahia, will produce about 350 million kWh annually. Apart from these plants, the Administration has undertaken a survey of twelve rivers with a view to constructing hydro-electric plants.

Traction

London.—MORE TROLLEY-BUSES.—On Sunday the trams were withdrawn from four routes on the Waltham Cross, Tottenham and Edmonton area and trolley-buses or motor-buses substituted, seventy-seven of the former being introduced. On November 6th another thirty-three trolley-buses will be brought into service for a further conversion scheme in the area.

Russia.—EXPRESS ELECTRIC LOCOMOTIVE.—The technical department of the Moscow Dynamo Works has designed a new "PB" electric locomotive, which is an improvement on the series "PB" electric locomotives constructed in 1933. The new locomotive, intended for fast passenger and express trains to run on the electrified sections of the Soviet railways, has a maximum speed of 111.8 miles per hour as against the 99.4 miles per hour of its predecessors. The new type of locomotive will be put into production early in 1939.

Southend-on-Sea.—DECISION TO ABANDON TRAMWAYS.—The Town Council has decided to abandon the tramways in view of the very unsatisfactory condition of the tramway track and rolling stock, the heavy annual charge which has to be borne by the undertaking in maintenance, and the very considerable expenditure which would have to be incurred to relay large sections of the track and to replace vehicles. It is proposed to obtain thirty-three new trolley-buses and seven motor-buses, and the total cost of the conversion scheme is estimated at £113,935.

United States.—ELEVATED RAILWAY SOLD.—The New York correspondent of *The Times* reports that the historic Sixth Avenue Elevated Railway, the principal line of the Manhattan Railway Co., was sold at a foreclosure last week to bondholders for $12,500,000 (£2,500,000), the upset price. The bondholders recently made an agreement with the Mayor of New York to sell the line to the Corporation for that amount, and so extinguish a lien for $9,000,000 which the Corporation holds against it for taxes. The railway is to be demolished when the Corporation obtains possession, it is stated.

West Hartlepool.—TROLLEY-BUSES.—The Town Council has received delivery of eight new trolley-buses which will be used on the West Hartlepool-Hartlepool route.

Municipal Supply Undertakings' Results

Town.	Engineer.	Total Revenue.		Working Expenses.		Net Profit.		Total Sales of Electricity. Thousands of kWh.		Percentage Increase.
		1936/37.	1937/38.	1936/37.	1937/38.	1936/37.	1937/38.	1936/37.	1937/38.	
		£	£	£	£	£	£			
Aberdeen	A. Gardner	260,400	285,956	150,549	168,110	14,909	17,320	62,362	69,436	11.4
Ayrshire Board	W. C. Bexon	371,160	396,104	248,439	277,795	6,886	4,575	84,028	91,753	9.2
Bacup	W. H. Metcalfe	35,945	37,557	22,237	25,813	8,611	5,923	6,943	7,592	9.2
Barking	W. E. Kidner	106,228	111,456	74,232	85,614	18,682	174	19,732	22,936	11.2
Barrow-in-Furness	H. R. Burnett	134,408	151,786	84,968	90,526	9,252	15,837	31,112	35,278	13.4
Bath	J. W. Spark	175,406	198,869	126,533	157,175	15,732	7,807	49,089	58,346	18.8
Belfast	F. H. Whysall	631,810	704,242	307,101	352,441	63,545	86,675	162,206	178,635	10.1
Bexhill	C. A. Frost	63,789	68,734	43,011	45,584	4,144	5,152	8,334	9,169	10.0
Birkenhead	F. E. Spencer	379,396	447,014	277,688	337,460	12,135	12,135	93,519	119,853¶	28.1
Birmingham	F. Forrest	2,868,963	3,040,518	1,942,983	2,192,818	363,207	192,538	707,990	778,084	9.9
Blackburn	R. H. Harral	242,446	249,999	118,466	* 127,565	32,278	29,747	45,433	52,879	16.4
Bradford	T. Roles	716,061	772,239	536,228	569,511	17,329	19,691	151,240	165,128	9.2
Bridlington	A. J. Beckett	42,042	46,416	23,851	28,646	7,067	5,158	4,005	5,092	27.1
Brighton	W. N. C. Clinch	527,213	550,056	382,610	412,657	21,795	12,768	124,004	128,381	3.5
Bristol	A. J. Newman	1,059,898	1,103,916	650,330	746,875	114,220	34,665	240,509	266,120	10.7
Bromley	W. G. Trend	115,535	124,153	75,936	84,409	39,599	39,744	16,238	18,018	10.9
Burnley	J. E. Starkie	117,369	129,700	83,722	96,523	452	83	20,413	23,849	16.8
Burton-on-Trent	T. Hall	193,802	212,593	123,153	142,367	19,606	16,161	41,210	46,134	11.9
Bury	J. G. Potts	144,790	152,700	110,513	121,363	17,464	15,823	35,985	39,408	9.5
Cardiff	E. Jones	430,031	446,094	261,762	307,056	95,114	56,044	117,448	131,478	11.9
Carlisle	C. W. Salt	135,895	147,051	93,067	104,132	6,662	6,622	25,318	28,155	11.2
Chester	S. E. Britton	155,087	183,653	103,724	119,850	3,082	15,779	24,438	28,587	17.0
Clacton	G. Broadhurst	50,982	59,676	25,609	29,434	315*	2,459	5,737	6,444	12.3
Coventry	W. J. Marston	583,157	681,936	93,178	105,724	55,488	57,448	182,563	214,123	17.3
Darwen	G. A. Newsome	44,926	47,436	27,895	29,243	6,134	7,129	7,022	7,334	4.4
Derby	F. Nicholls	356,693	382,648	232,754	258,812	26,864	9,887*	78,273	86,143	10.0
Dover	R. G. Widgery	67,424	70,371	47,174	46,956	1,938	5,116	6,333	6,901	9.0
East Ham	W. R. Elliott	195,217	207,237	131,039	142,381	5,490	5,624	3,890	3,934	1.1
Eastbourne	J. K. Brydges	236,032	231,250	189,837	172,508	4,755*	5,330	36,192	36,831	1.7
Erith	E. A. Logan	81,474	98,160	59,448	77,503	13,503	9,400	24,383	29,183	17.2
Gainsborough	E. Breckell	27,249	29,657	17,050	20,809	1,239	1,943	4,927	5,611	14.0
Glasgow	H. Bell	1,378,500	1,499,982	899,023	975,893	145,375	173,816	413,372	458,224	10.9
Gravesend	C. F. McInnes	122,697	124,146	72,805	84,312	14,006	3,727	33,333	37,260	11.8
Great Yarmouth	P. E. Rycroft	181,342	200,873	99,049	106,155	15,054	24,240	33,686	38,086	13.1
Guildford	W. E. Affleck	121,289	139,976	67,039	85,606	10,885	5,913	25,541	30,681	20.2
Hackney	E. A. Mills	398,301	427,368	278,921	301,267	15,242	15,291	59,927	68,172	13.8
Hampstead	H. Brierley	213,035	219,203	189,795	192,069	23,679	27,237	41,984	44,818	6.8
Hastings	A. J. Ryan	236,501	245,191	217,158	223,218	19,343	21,973	46,840	46,587	0.5
Hornsey	F. C. Orchard	120,636	139,722	85,446	99,023	1,225*	100	14,854	18,262	22.9
Hull	J. N. Waite‡	769,930	840,432	553,569	629,428	59,947	54,318	196,642	217,379	10.0
Ipswich	H. E. Blackiston	253,549	283,305	169,356	202,041	34,266	33,249	45,107	51,010	13.0
Islington	A. P. MacAlister	325,216	365,646	244,274	265,103	16,533	27,905	51,953	58,937	13.1
Kettering	W. A. Walker	249,897	243,659	195,242	184,397	3,929	5,203	91,145†	69,900†	− 23.3
Kirkcaldy	O. F. Francis	44,683	51,163	35,284	39,214	372*	254	8,905	9,907	11.3
Lancaster	G. C. Milnes	157,165	178,441	104,283	121,635	17,718	20,833	37,663	40,453	7.2
Leeds	C. Nelson Hefford	1,020,448	1,099,090	463,863	544,853	112,411	90,491	247,834	258,994	4.5
Leicester	J. Mould	716,498	744,956	454,896	490,031	66,308	74,774	136,172	147,351	8.2
Leigh	J. B. Hudson	76,058	83,562	53,128	56,575	8,874	12,761	11,988	13,275	10.7
Lincoln	F. Newey	122,582	139,696	87,328	100,831	2,097	6,203	28,052	32,338	15.3
Liverpool	P. J. Robinson	1,964,831	2,090,207	1,220,424	1,416,583	99,379	224,319	435,294	473,258	8.7
Loughborough	J. P. Tucker	77,229	74,271	55,790	58,398	6,716	373	14,892	15,015	8.7
Manchester	H. C. Lamb	2,109,449	2,183,082	1,494,518	1,702,518	147,671	79,576	508,931	532,042	4.5
Morecambe and Heysham	P. Clegg	66,952	70,711	38,937	51,929	12,732	4,484	11,954	13,423	12.2
Newport	A. Nichols Moore	258,567	294,813	177,409	211,704	2,873	8,481	54,928	68,064	23.9
Newton-in-Makerfield	W. Phoenix	32,148	33,988	23,514	26,332	1,529	153	5,789	6,327	9.3
Oldham	F. L. Ogden	331,927	356,173	152,037	189,759	31,661	21,160	73,209	82,480	12.6
Oxford	H. G. Fraser	207,177	236,011§	139,532	169,999	34,141	29,953	27,429	31,948	14.0
Plymouth	H. Midgley	274,462	283,794	186,402	201,920	10,949	33,595	45,956‖	49,168‖	7.0
Poplar	R. Illingworth	311,786	329,114	212,768	233,114	34,300	19,751	63,035	67,992	7.8
Portsmouth	B. Handley	532,442	614,087	45,308	47,425	45,308	47,425	105.674	123,059	16.4
Preston	G. A. Robertson	505,968	527,755	361,506	359,560	3,307	27,846	59,812	69,756	16.5
Rawtenstall	J. E. Shepherd	69,915	74,118	50,721	57,832	6,177	3,206	19,405	21,180	8.3
St. Helens	W. S. Johnston	220,491	250,747	146,155	181,578	42,139	20,513	64,128	75,808	18.2
St. Marylebone	C. H. Smyth	741,341	777,668	557,900	598,197	13,815*	27,116*	189,791	208,184	9.7
St. Pancras	R. Lee	417,710	445,903	273,662	309,204	28,355	25,653	72,245	78,672	8.9
Salford	L. Romero	432,927	447,148	304,168	313,475	34,475	39,696	108,419	111,818	3.1
Sheffield	J. R. Struthers	1,337,439	1,431,445	795,497	868,794	195,324	239,020	476,960	542,482	13.7
Southampton	W. G. Turner	397,205	440,478	141,000	163,832	10,462	47,152	78,301	87,434	11.7
South Shields	N. T. Smith	133,617	147,436	79,285	93,596	571	8,497	19,344	16,204	19.4
Southend	A. C. Johnson	372,899	403,577	225,300	251,690	5,992	3,113*	59,464	65,839	10.6
Stalybridge Board	J. H. Lumsden	200,451	227,182	139,405	153,658	27,848	32,038	60,179	69,066	14.6
Stirling	W. R. Murray	27,698	31,116	22,248	25,087	1,254	327	4,191	4,436	5.7
Stockton	S. G. Marston	90,285	97,597	74,171	82,513	16,114	12,157	13,720	15,720	14.6
Stoke-on-Trent	C. H. Yeaman	383,607	440,125	248,192	288,914	41,217	45,324	92,852	111,574	20.2
Stretford and District	T. A. Kerr	414,511	474,077	310,072	357,380	15,217	25,530	157,646	177,017	12.3
Sunderland	W. A. Royle	242,255	264,276	76,890	95,941	16,839	33,175	56,831	68,601	20.8
Sutton Coldfield	T. Bloore	69,789	76,182	40,330	47,282	6,155	2,467	10,594	12,440	17.4
Wallasey	B. T. Hawkins	213,613	226,616	147,798	162,071	14,992	14,879	32,997	34,951	5.9
Walsall	E. A. Newburn	218,080	230,168	143,631	157,248	35,061	34,585	41,473	47,646	15.0
Watford	A. W. Barham	229,474	242,162	135,291	167,846	27,812	26,938	54,847	61,535	12.2
West Ham	J. W. J. Townley	581,460	643,779	407,322	446,270	60,253	73,471	143,279	155,100	8.4
Willesden	J. D. Spark	348,601	368,663	273,003	268,069	22,742	27,410	73,880	81,014	9.7
Winchester	R. Ayton	60,035	64,937	38,812	41,899	1,222	3,782	4,244	4,598	8.3

* Net loss. † Includes bulk supply to Corby steelworks which dropped from 67,467,000 kWh in 1936–37 to 41,795,000 kWh in 1937–38. ‡ Since resigned to take up new appointment. § Includes £12,882 bulk supply adjustment. ‖ Includes bulk supply to Plympton R.D.C. and (until June 30th, 1936) to East Cornwall Power Co. ¶ Includes bulk supply to Lever Bros. amounting to 50 million kWh; increase otherwise 14.3 per cent.

Personal and Social

Information regarding new appointments and other matters of interest for this page are welcomed

Mr. J. J. Gracie has been appointed commercial manager of the Witton Engineering Works of the General Electric Co., Ltd. He was educated at the City and Guilds Engineering College, London, and received his practical training with Short Bros., aeronautical engineers, Bedford. In 1921 he joined the Osram Lamp Works as technical assistant and shortly afterwards was transferred to the production staff. The following year he transferred to the M.O. Valve Co., Ltd., to introduce quantity production methods in the manufacture of radio receiving valves. Returning to the Osram Lamp Works in 1928, he was placed in charge of production, and he held this

[*Elliott & Fry*

Mr. J. J. Gracie **Mr. N. F. T. Saunders**

position until 1931, when he left to join a firm of consulting engineers, and in the capacity of chief engineer supervised on their behalf the reorganisation of a number of factories in the Midlands. In 1937 he became general manager and director of Coldair, Ltd., a subsidiary of the G.E.C., built a new factory for them at Wembley, and reorganised the business along G.E.C. lines.

Mr. N. F. T. Saunders, B.Sc., A.M.I.E.E., has been appointed general manager of Coldair, Ltd., in succession to Mr. Gracie. He served his apprenticeship with a firm of shipbuilders and engineers at Glasgow, whence he proceeded to the Royal Technical College. He joined the General Electric Co., Ltd., in 1929, and until early in 1934 served in the capacity of designer, at the company's Witton Works, of fractional horse-power motors and fans. A period in charge of the technical side of the Domestic Appliance Department of the Gramophone Co., Ltd., was followed by an appointment as chief engineer of Lancashire Dynamo & Crypto, Ltd., from which position he resigned to return to the G.E.C. in his new appointment with Coldair, Ltd.

Lt.-Col. Lord Dudley Gordon, D.S.O., chairman and managing director of J. & E. Hall, Ltd., was re-elected president of the British Engineers' Association, Inc., at the meeting of Council following the annual general meeting on October 13th.

The strong position which the Birmingham Electric Club now holds in the Midlands is reflected in the growing difficulty of finding adequate accommodation for its various social functions. Actually, about two hundred applications for tickets for last Friday's ladies' evening at the Grand Hotel had to be refused. The four hundred fortunate persons present enjoyed a varied programme of both old and new dances. At supper the health of the ladies was proposed by the president, **Mr. F. S. Ette,** Mrs. Ette responding, and each lady received a present of a pair of cut-glass dishes. Dancing went on till 2 a.m., and **Mr. A. T. Haywood,** the hon. social secretary and the members of the social sub-committee, are to be congratulated on the complete success of the evening.

The annual dinner of the Southern Division of the Electrical Power Engineers' Association will be held on November 25th (not November 5th as stated in our last issue) at the Holborn Restaurant, London, W.C.

A luncheon under the chairmanship of Mr. A. D. Phillips, general manager of the Derby & Notts Electric Power Co., was held by the Nottinghamshire branch of the E.I.B.A. on October 12th to welcome the president of the Association, **Mr. Ernest E. Sharp,** on his visit to the town. Mr. Sharp emphasised the necessity for building up greater financial reserves, and for getting a larger revenue income in view of the rapid increase in the claims on the Association's funds, which were doubling every two years. Mrs. Sharp also spoke and referred to the Association's diplomatic work in getting to know people who needed help but were shy in asking for it. Mr. Phillips, chairman of the E.I.B.A. Nottingham sub-committee, said that in spite of the president's complimentary remarks on the liveliness of their branch, it should be more liberally supported in the area than it had been in the past.

Institution of Civil Engineers Awards.—The Council of the Institution of Civil Engineers has awarded the prize of £25 to Mr. W. E. Reed for his article submitted in competition under the will of Mr. R. E. S. Cooper for the best answer to a problem on "Ingenuity," or the power to deal with an emergency cheaply, effectually and quickly. The following are among the additional awards which have been made for the session 1937-38 for papers read and discussed at ordinary meetings:—Telford Premiums: Sir George Lee—"Recent Engineering Developments in the General Post Office"; Messrs. W. C. Parker and H. Clarke—"Fulham Base-Load Power Station: Mechanical and Electrical Considerations"; Messrs. W. Hudson and J. K. Hunter—"The Galloway Hydro-Electric Development, with special reference to the Constructional Works." Mr. R. W. Mountain—"The Galloway Hydro-Electric Development, with special reference to its Interconnection with the Grid." Mr. W. A. Tookey—"Combustion-Efficiencies of Gas and Oil Engines." Mr. J. F. Hay—"Constructional Work of the Fulham Power Station." The Coopers Hill War Memorial prize has been awarded to Messrs. W. Hawthorne and F. H. Williams jointly for their paper on "The Galloway Hydro-Electric Development, with special reference to the Mechanical and Electrical Plant."

In connection with the transfer of the Bury St. Edmund's Corporation electricity undertaking to the East Anglian Electricity Supply Co., Ltd., the Town Council has decided to grant **Mr. A. E. Knights,** the former borough electrical engineer and now resident engineer to the East Anglian Co., and the borough treasurer a special payment of £50 each as a token of its appreciation of the services rendered by them. All whole-time employés of the Electricity Department at the time of the transfer are to receive two weeks' pay.

Mr. C. Roy Nilsson, of Sydney, was recently elected president of the Electrical Contractors' Association of New South Wales.

Mr. J. M. Reilly has been nominated for the presidency of the Belfast Association of Engineers.

Mr. J. Jones, engineer to the South Wales Coalite Co., Pencoed, Bridgend, was last week elected president of the South Wales branch of the Association of Mining Electrical Engineers at the meeting at Cardiff. He received his training in mechanical and electrical engineering at Newport Technical Institute, and in the engineering shops of John Lancaster & Co. For several years he was in charge of various groups of collieries under John Lancaster & Co., and later, the Ebbw Vale Steel, Iron and Coal Co. In his presidential address Mr. Jones said that thirty years ago the Association was founded mainly to minimise risks attending the application of electricity to the mining industry. Referring to the rise in the number of electrically driven coal-cutters in the industry, he said that they increased during 1937 by 200, which resulted in an increase in electrically cut coal of over 7,000,000 tons. The number of electrical conveyors in collieries had also risen tremendously during the last few years.

Dr. P. Dunsheath, O.B.E., a director of W. T. Henley's Telegraph Works Co., Ltd., was recently presented by his

The presentation to Dr. P. Dunsheath by his co-directors of W. T. Henley's Telegraph Works Co., Ltd.

co-directors with an inscribed silver salver, to mark the occasion of his marriage on August 24th to Miss Joyce Houchen.

Mr. T. P. Strickland, chief engineer of the Melbourne and Metropolitan Tramways Board, has resigned from his post owing to ill-health. He was formerly chief assistant electrical engineer to the New South Wales Railways and Tramways Department.

The third annual electrical industry ball organised jointly by the Coventry branches of the Electrical Development Association and the Electrical Association for Women and by the City of Coventry Electricity Department staff is to be held at the Rialto Casino Ballroom, Radford, on Friday, November 18th. Tickets are obtainable from the hon. secretary of the

Joint Social Committee, **Mr. A. A. Harris**, Electricity Department, Council House, Coventry.

The Leicestershire and Warwickshire Area Electrical Development Circle is holding a dance on November 17th at St. George's Hall, Hinckley, the proceeds of which will be devoted to the funds of the Electrical Industries Benevolent Association. Tickets can be obtained from **Mr. R. B. Giles**, hon. secretary, Upper Bond Street, Hinckley.

Over ninety guests were present at a whist drive held by the Hull and East Riding Branch of the Electrical Association for Woman on October 12th. **Mrs. Benno Pearlman** (president) presented the prizes.

Obituary

Mr. J. T. Brownlie, ex-president of the Amalgamated Engineering Union, died on the Canadian Pacific liner *Duchess of Richmond* on October 13th. Mr. Brownlie was president of the Union for seventeen years before his retirement in 1930.

Mr. S. Delany.—The death occurred on October 11th of Mr. S. Delany, A.M.I.E.E., at the age of sixty-four. Mr. Delany was the district engineer of the English Electric Co.'s northern territory, Manchester, and was well known to many engineers engaged in the industry in the North of England. He joined the staff of Dick, Kerr & Co., Ltd., in 1902, and was appointed district engineer, northern territory, on the formation of the English Electric Co., Ltd.

Mr. H. Cooke-Smith.—We regret to record the death, which occurred on October 16th, of Mr. H. Cooke-Smith, sales manager of the Meter Department of Metropolitan-Vickers Electrical Co., Ltd. Mr. Cooke-Smith joined the company in 1903, but left in 1907 to take up a post on the Central London Railway. He rejoined the Met.-Vick Co. in 1909, and remained till 1916, when he left for war service. On demobilisation he rejoined the company but left in 1921 to take up a position with Messrs. Cammell Laird. Returning to the Metropolitan-Vickers Co. in 1923, he remained with it until the time of his death. His position since 1923 had been that of manager of sales of meters and instruments, but latterly his field of activity had been considerably widened.

The late Mr. H. Cooke-Smith

Mrs. W. J. Parslow.—We regret to learn of the death, on October 17th, of Mrs. Parslow, wife of Mr. W. J. Parslow, a director and general manager of Tecalemit, Ltd.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

W. R. Small, Ltd.—Private company. Registered October 10th. Nominal capital, £100,000. Objects: To acquire the business of a mica merchant and importer of pure mica, carried on by W. R. Small at 20 and 146, Hockley Hill, Birmingham, and to carry on the business of manufacturers of micanite, bakelite and other insulating materials and components, metallurgists, manufacturers of and dealers in mica elements, electrical and wireless apparatus, &c. The first directors are: W. R. Small, Hayley Green, Halesowen, R. Dickens, 42, Sandon Road, Edgbaston, Birmingham, and S. P. Lugg, 111, Bearwood Road, Smethwick. Solicitors: Harold Mayhew & Co., 47, Temple Row, Birmingham.

Industrial Controls, Ltd.—Private company. Registered October 12th. Capital, £100. Objects: To carry on the business of general, electrical and mechanical engineers and contractors, toolmakers, scientific instrument makers, manufacturers of and dealers in and agents for the sale of chemicals and chemical preparations, &c. Wm. Bell, 59-60, Chancery Lane, W.C.2, is the first director.

John L. Harvey, Ltd.—Private company. Registered October 12th. Capital, £1,000. Objects: To carry on the business of merchants, engineers' representatives and dealers in and distributors, manufacturers and installers of all kinds of engineering, mechanical, electrical, insulating, refrigerating and air conditioning machinery, &c. The directors are: J. L. Harvey (permanent chairman and managing director) and others to be appointed by the subscribers. Secretary: J. Walker. Registered office: 628, Royal Liver Building, Liverpool.

Eiderlux Products, Ltd.—Private company. Registered October 14th. Capital, £1,500. Objects: To acquire the business carried on at 87, Mosley Street, Manchester; to adopt an agreement with A. C. Murphy and D. H. Hewitson, and to carry on the business of manufacturers of and dealers in electrical, gas, oil and quartz lamps, reflectors, bells, fires, stoves, cookers and heating appliances, &c. The directors are: T. H. Leather, "Harleigh," New Hall Road, Broughton Park, Salford; A. C. Murphy, 90, George Street, Higher Broughton, Salford; and D. H. Hewitson, 29, Granville Road, Audenshaw, Lancs. Solicitors: J. G. Ogden Hardicker, Hanson & Co., Northern Assurance Buildings, Albert Square, Manchester.

F. G. Gossling, Ltd.—Private company. Registered October 15th. Capital, £1,000. Objects: To carry on business as electrical engineers and installation contractors, &c. The permanent directors are: F. G. Gossling (managing director) and H. Gossling, both of 2, Burdett Road, Wisbech.

Aerials (Birmingham), Ltd.—Private company. Registered October 11th. Capital, £100. Objects: To carry on the business of suppliers, erectors, manufacturers and maintainers of aerials for radio and television receiving stations, sets and instruments, &c. The directors are: M. Taylor, 47, High Street, Rhyl; F. G. Davies, 76, Caroline Street, Birmingham, 3; and H. Bull, 31, Colville Road, Sparkbrook, Birmingham. Secretary: F. G. Davies. Registered office: 143, Weoley Avenue, Selly Oak, Birmingham.

Returns of Electrical Companies

Caxton Electric Developments, Ltd.—Capital: £300,000 in £10 shares. Return dated June 3rd, 1938. 20,000 shares taken up. £70 paid in cash on seven shares, £199,930 considered as paid on 19,993 shares. Mortgages and charges nil.

Bude Electric Supply Co., Ltd.—Capital, £30,000 in £1 shares. Return dated May 16th, 1938. All shares taken up. £30,000 paid. Mortgages and charges: £2,500.

General Gas & Electricity Co., Ltd.—Capital, £400,000 in 35,000 5 per cent. redeemable preference, 17,885 5 per cent. preference, 13,955 4½ per cent. preference, 133,160 preference (unclassified), and 200,000 ordinary shares of £1. Return dated July 14th, 1938. 35,000 5 per cent. redeemable preference, 17,885 5 per cent. preference, 13,955 4½ per cent. preference, and 94,717 ordinary shares taken up. £161,557 paid. Mortgages and charges: £40,000.

Mid-Lincolnshire Electric Supply Co., Ltd.—Capital, £700,000 in £1 shares. Return dated June 14th, 1938. All shares taken up. £520,000 paid (£1 on 445,000 shares and 10s. on 150,000 shares). £105,000 considered as paid on 105,000 shares. Mortgages and charges, nil.

Guy V. Laycock, Ltd.—Capital, £10,000 in £1 shares. Return dated June 18th, 1938. 5,200 shares taken up. £1,200 paid. £4,000 considered as paid. Mortgages and charges, nil.

Melfod Electricity Co., Ltd.—Capital £100 in 400 shares of 5s. each. Return dated May 26th, 1938. 40 shares taken up. £10 paid. Mortgages and charges, £1,050.

Edward Girdler, Ltd.—Capital, £2,000 in £1 shares. Return dated September 13th, 1938. 1,803 shares taken up. £1,803 paid. Mortgages and charges, £1,000.

Brentwood District Electric Installations, Ltd.—Capital, £1,000 in 20,000 shares of 1s. each. Return dated April 1st, 1938. All shares taken up. £1,000 paid. Mortgages and charges, nil.

City Electrical Monumental Works, Ltd.—Mortgage on sites numbered 41, 42, and 43, Petersfield Estate, Higher Compton, Plymouth, dated September 30th, 1938, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £750.

Penarth Electric Lighting Co., Ltd.—Satisfaction in full on September 30th, 1938, of 4½ per cent. first mortgage debenture stock registered January 11th, 1910. (According to the register of mortgages the debenture stock registered January 11th, 1910, originally secured not more than half the nominal capital for the time being.)

Peto Scott Electrical Instruments (Holdings), Ltd. (formerly British Radio Gramophone Company, Ltd.)—Particulars filed of £5,000 debentures, authorised October 1st, 1938, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £1,000.

Modern Telephone Co., Ltd.—The nominal capital has been increased by the addition of £9,000 beyond the registered capital of £3,000. The additional capital is divided into 6,000 ordinary and 3,000 7½ per cent. cumulative participating preference shares of £1.

Alliance & Surrey Wholesale, Ltd.—The nominal capital has been increased by the addition of £10,000 in £1 ordinary shares beyond the registered capital of £10,000. All the shares in the original capital have been converted into 10,000 ordinary shares of £1 each.

City Notes

Murex, Ltd., held its annual meeting on October 17th when Mr. G. P. Joseph (chairman), who presided, said that their subsidiary company, Murex Welding Processes, had completed the transfer of its staff and employés to its new freehold premises at Freezywater, Waltham Cross, and the former premises at Walthamstow had been sold. Although a certain amount of constructional work on the canteen building was still proceeding, the main factory building, offices and laboratories were occupied, and the factory was now in full operation. The main factory building, which had a floor area of approximately 4½ acres, represented an excellent example of an all-welded single-storey building incorporating the latest practice in welded design. The welding industry continued to expand, and despite keen competition their output and sales had shown some increase during the year under review. Selling prices had been reduced to meet continued and increased competition, and they hoped that the greater manufacturing capacity of the new factory would further reduce their costs and enable them

to continue to meet that competition and to attain a larger share of the market. The interests which Murex Welding Processes had in the Premier Electric Welding Co. (Mersey), Ltd., and in the Australian E.M.F. Co., both continued to be satisfactory.

Ensign Lamps, Ltd., is paying a final dividend of 15 per cent. on the ordinary shares, making 25 per cent., less tax, for the year. The company was made a public one in April, 1937, and for the six months to June 30th, 1937, paid a dividend of 10 per cent., less tax.

Max Stone, Ltd., report a net profit for the year to June 30th of £32,433, an increase of £2,429 as compared with the preceding year. Reserve for income tax and N.D.C. receives £10,000 and £10,000 is appropriated to creating a general reserve. As we have already announced, the ordinary dividend for the year is 10 per cent. (against 17½ per cent.), and £4,798 is carried forward (against £4,170 brought in).

The Bengal Telephone Corporation reports a profit for the year ended June 30th of Rs.13,36,314, as compared with Rs.12,58,567 in the preceding year. The ordinary dividend for the year is 8 per cent. tax free (same), and a bonus of 2 per cent., tax free (same), leaving Rs.2,23,969, to which is added Rs.6,22,094 brought in. Contingencies account receives Rs.7,50,000 and Rs.96,064 is carried forward.

The Electrolytic Zinc Co. of Australasia reports that after transferring £145,000 to depreciation reserve, the gross profit for the year ended June 30th is £584,435, as compared with £681,513 in the preceding year, and the net profit is £459,524 (against £536,613), to which is added £97,078 brought in, making £556,601 available. The total dividend for the year is 15 per cent. (against 17½ per cent.), and £166,601 is carried forward. The report states that the decreased profit is due primarily to lower metal prices during the period.

The Scottish Power Co. —Underwriting has been arranged in connection with an issue at par of 500,000 £1 4 per cent. cumulative preference shares. The proceeds will be applied in meeting capital expenditure on the properties of the group, including the Grampian Co.'s hydro-electric works and on extensions to transmission lines and sub-stations. The issue is being made by the Power Securities Corporation. The subscription list was to open yesterday (Thursday).

Companies Struck Off the Register.—The names of the following companies have been struck off the Register and they are thereby dissolved: Arthur for Wireless, Ltd.; Botolph Radio, Ltd.; Cam Electrical, Ltd.; Home Electric, Ltd.; Radia Electric Co. (Gloucester), Ltd.

The Carrier Engineering Co., Ltd., has declared an interim ordinary dividend of 25 per cent., less tax. The company reduced its ordinary dividend for the year ended June 30th to 25 per cent., less tax, from 50 per cent. This decision was made during the last week of September owing to the international uncertainty prevailing. It was then stated by the board that should circumstances permit it was proposed to depart from the usual practice of declaring annual dividends and to consider payment of an early interim dividend.

Drake & Gorham, Ltd., have announced a first and final dividend of 2½ per cent. (same).

Radio Central Exchanges, Ltd., reports a profit for the year ot May 31st of £363, as compared with £410 in the preceding year, increasing the credit carried forward to £5,427.

The Pressed Steel Co., Ltd., is paying an interim dividend of 10 per cent., less tax, on the capital of £828,611, as increased by £137,927 in October last. The interim distribution last year was 14 per cent., less tax, on £690,684 ordinary stock.

Stocks and Shares

TUESDAY EVENING.

STOCK Exchange business is slowly reverting to what may be called its pre-crisis condition. By no means all of the fall brought about by the various shocks at the end of September has been recovered, but a good deal of the damage is already repaired. The price of War Loan, for instance, which fell to 92, with business marked at 90, is up to 100¼. This sets the tone for investment stocks and shares as a whole. Capital is cautious of returning to industrial markets, owing mainly to the impression that additional taxation will be imposed in order to pay, not only for the expenditure caused by the recent flurry, but for the much more formidable amount required to prosecute the armament programme with still greater energy.

The American market continues to exercise a decided though not entirely deciding influence. Stock Exchange business, speaking generally, is proceeding on jog-trot lines. For the time being, no particular disposition is shown, either by investment or speculation, to take any marked interest in stocks and shares.

Gilt-edged

Circumstances have been rather too much this week for the gilt-edged market, in which prices are showing a certain amount of weakness. Government borrowing on a large scale, to meet the cost of the crisis and of larger armaments, is regarded by most people as assured. There is talk about an immediate Government issue. A higher rate of taxation for next year has also come to be regarded as a foregone conclusion. These two considerations alone would hang heavily on the gilt-edged market, but they appear to have been joined by a third in the shape of Continental distrust of British currency and securities. Weakness of sterling in terms of the dollar is the visible sign that money is passing across the Atlantic. Securities are being sold in this country for the proceeds to be reinvested there. Gilt-edged stocks feel, as much as any, the draught from such a movement, and Continental sales have doubtless played a part in depressing War Loan, for instance, from 101⅜ to 100¼. Electrical stocks in the prior-charge market are, however, mostly unchanged.

Electricity Supply

Sensitive to conditions in the gilt-edged market, prices of home electricity supply shares are slightly easier here and there. Yorkshires at 40s., and North Easterns at 31s., have lost 1s. Midland Electrics at 40s. are 9d. down. Palestine Electrics have weakened to 27s. on the serious local developments. Uneasiness is felt less on the score of possible damage to the company's property than through fear that the disturbed condition of business may interfere with the demand for power. An advance to 32 dollars in Montreal Power reflects the popularity of sound Canadian investments. A fall of ⅛ to 71s. 3d in Victoria Falls appears to be a natural reaction after the steep rise.

Subscription lists open this week for the issue of half a million Scottish Power 4 per cent. preference shares at par. The new shares will rank equally with the existing preference stock. In the absence of any debenture loan, the preference stocks have the first claim on revenue.

Traction and Transport

London Transport Board "C" stock at 76 has recovered practically the whole of the fall brought about by the dividend decision. The latter provided for a final payment making 4 per cent. for the year, that rate being ¼ per cent. lower than the previous distribution and 1½ per cent. short of the statutory payment. No sign has yet been given that stockholders propose to avail themselves of the right, which this shortcoming gives them, to apply for a receivership. The rise in price follows a report that consideration is being given to the question of raising fares in order to bring the revenue more nearly into line with the level originally contemplated. Other stocks in the group are easier, with Tillings at 43s. 9d. and British Electric Traction deferred at 925. Home railway issues have recovered to a small extent from the depressing effect of last week's strike, but, exceptionally, Southern preferred is 3 points lower at 51½. Brazilian Tractions at 13⅛ are a good spot among the dollar stocks.

Equipment and Manufacturing

Lacking any particular stimulus from the trade or political news, industrial markets have a heavy air. Dullness in gilt-edged has been unhelpful to sentiment, and the shares have had to compete for interest with the more lively gold, and American commodity markets. Several of the electrical equipment leaders are one or two shillings off. General Electrics, for instance, have lost 1s. 6d. to 76s., and Associated Electrical 1s. to 37s. 6d. Both Callenders and, to a similar extent, Crompton Parkinsons, have been depressed by last week's announcement that negotiations for the projected partnership have fallen through. Callenders are changing hands down to 81s. 6d., against 85s. a week ago, and Cromptons at around 23s. 9d., against 25s. Before news of the break, Callenders were 91s. 3d., cum-dividend. Brush stock, which has been in the news on account of the amalgamation with Petters, has eased off to 5s., with the new £1 shares at par and the interesting options at 2s. 6d. Murex are ⅜ lower, at 72s. 6d., although the report was generally liked. At a meeting on Monday in this week, the chairman gave a very interesting résumé of the company's varied activities. A measure of disappointment that Tube Investments, after raising the interim dividend, is making the same total distribution as for last year, had no effect on the shares, at 4½.

American Utilities

Although showing some irregularity, Wall Street continues to give, on balance, a display of firmness which has not been without its tonic effect in London. Outstanding in the advance in prices since the passing of the crisis has been the behaviour of utility stocks. Because of the Administration's pressure on these companies, the stocks have for some time been lagging behind the industrials. They have now come well to the front, prices being higher than for nearly twelve months past. Explanation is found in the evidence that the leading holding companies are showing a readiness to sink their own grievances, and to co-operate with the American Government's electricity plans. Reports are about, too, that the Administration is discussing with the power companies a two hundred million pounds electricity generating scheme as a part of the national defence plans. Since this all points towards large orders for electrical plant and equipment, the stocks of the manufacturing concerns are particularly active. General Electric common stock has risen to $50, while Westinghouse Electric, at $126, has doubled in price this year.

Miscellaneous Matters

Cable and Wireless stocks have failed to hold all the recent improvement; the ordinary, at 44, and the preference, at 89, are each £1 lower. Steel and engineering issues are no exception, as might have been expected under the circumstances, to the dullness of industrial shares. Babcock & Wilcox have declined from 38s. 9d. to 37s. 6d., International Combustion from 5⅛ to 5, and Mather & Platt from 46s. 3d. to 44s. 6d. Vickers are steady at 21s. 6d. Rubber shares are neglected despite the firmness of the raw stuff at around 8½d. Copper has stolen the thunder in the commodity markets as a result of the decision to remove all restrictions on production. Prices of the shares concerned reflect a bullish interpretation of the move.

Electrical Companies' Shares

Prices, dividends and yields

Company	1938. Highest.	1938. Lowest.	Dividend. Previous.	Dividend. Last.	Price Oct. 18.	Rise or Fall.	Yield p.c. £ s. d.
Home Electricity Companies.							
Bournemouth and Poole...	68/3	62/–	15	15	67/6	—	4 8 7
British Power & Light ...	30/9	24/6	6	7	28/6	—	4 18 3
City of London	34/6	28/6	7½	7½	31/6	+6d.	4 15 3
Clyde Valley	42/6	33/–	8	8	35/9	—	4 9 4
County of London ...	51/9	38/9	10½	10½	46/6	—	4 10 5
Edmundson's :							
7% Pref.	33/3	30/–	7	7	32/–	—6d.	4 7 6
Ord.	40/9	18/9	9	9	25/6	—6d.	—
Elec. Dis. Yorkshire ...	43/6	37/9	9	9	42/6	—	4 4 8
Elec. Fin. and Securities...	51/9	49/–	12½	12½	50/–	—	5 0 0
Elec. Supply Corporation...	55/–	50/–	12	12	53/9	—	4 9 5
Isle of Thanet	21/3	18/6	4	4	20/–	—	4 0 0
Lancs Light and Power ...	35/–	26/–	7½	7½	31/3	—	4 16 0
Llanelly Elec.	23 6	21/–	5½	5½	21/6	—	5 2 4
Lond. Assoc. Electric ...	32/9	28/–	7	7	30/9	—	4 11 4
London Electric	36/3	32/–	8	10	34/–	—	4 2 4
London Power Deb. Red.	108¾	100	5	5	105	—	4 15 3
Metropolitan	51/–	41/–	10	12	47/6	—	5 1 1
Midland Counties	39/9	33/–	8	8	37/6	—	4 5 3
Mid. Elec. Power	41/9	37/–	8	9	40/–	—9d.	4 10 0
Newcastle Elec.	31/9	27/6	7	7	30/–	—	4 13 4
North Eastern Electric :							
Ordinary	34/–	25/–	7	7	31/–	—1/–	4 10 6
7% Pref.	34/–	30/–	7	7	32/–	—	4 7 6
Northampton	47/6	43/9	10	10	46/3	—	4 6 7
Notting Hill 6% Pref. (£10)	14	13½	6	6	13½	—	4 9 0
North Met. Elec. :							
Ordinary	49/–	43/–	10	10	47/6	—	4 4 3
6% Pref...	30/6	28/3	6	6	30/–	+6d.	4 0 0
Richmond Elec.	30/6	28/–	7	7	28/9	—	4 17 5
Scottish Power	38/9	32/–	8	8	36/3	—9d.	4 8 2
Southern Areas	22/9	18/6	4½	5	21/3	—	4 14 1
South London	32/6	31/–	7	7	31/6	—	4 9 0
West Devon	23/3	21/3	5	5	1¼	—	4 9 0
West Glos.	19/–	16/9	2	2	18/–	—	2 4 5
Yorkshire Elec.	42/–	36/9	8	8	40/–	—1/–	4 0 0
Overseas Electricity Companies.							
Atlas Elec.	4/6	2/6	Nil	Nil	3/3	—	—
Calcutta Elec.	44 3	36/3	12*	10*	1¾	—	5 6 8
Cawnpore Elec.	40/–	35/–	10	10	36/3	—	5 10 6
East African Power ...	28/3	22/6	7	7	26/–	—	6 5 0
Jerusalem Elec.	26/9	23/3	5	6	25/–	—	4 16 1
Kalgoorlie (10/–)	12/–	9/6	7½	7½	10/9	—	6 19 6
Madras	34/6	28/9	8*	8*	30/–	—	5 6 8
Montreal Power	31¾	26⅝	1½	1½	32/–	+¼	—
Palestine Elec. "A" ...	31/9	27/–	7½*	7½*	27/–	—1/9	5 11 2
Perak Hydro-electric ...	25/3	17/–	7	6	20/–	—	6 0 0
Shawinigan Power ...	23½	16½	65cts.	85cts.	22¼	—	—
Tokyo Elec. 6%	6½	39	6	6	52½	—	11 8 6
Victoria Falls Power ...	76/3	55/–	12	13½	71/3	—⅛	3 15 7
Whitehall Investments Pref.	22/3	15/–	7½	7½	18/9	—	8 0 0
Public Boards.							
Central Electricity :							
1950–70	115¾	97	5	5	111	—	4 10 1
1955–75	118½	100	5	5	112½	—	4 9 0
1951–73	111	95	4½	4½	109½	—	4 2 2
1963–93	101	85	3½	3½	97½	—½	3 11 10
London Elec. Trans. Gtd.	93½	88	2½	2½	91½	—	2 14 8
London & Home Counties,							
1955–75	112¾	97½	4½	4½	110	—	4 1 10
Lond. Passenger Transport :							
A	119½	110	4½	4½	116½	—	3 17 4
B	122¾	105	5	5	116½	—	4 5 10
C	84	68	4¼	4	76	+3½	5 10 4
West Midlands Joint Elec.,							
1948–68	115¼	102½	5	5	110½	—	4 10 6
Telegraph and Telephone.							
American Tel. & Tel. ...	154½	114	9	9	154½	—	5 16 6
Anglo-Am. Tel. :							
Pref.	115½	103	6	6	106½	—	5 12 7
Def.	28	24	1½	1½	25	—	6 0 0
Anglo-Portuguese ...	23/6	19/3	8	8	22/6	—	7 2 3
Cable & Wireless :							
5½% Pref.	104	84	4½	5½	89	—1	6 3 9
Ord.	67¾	36	—	4	44	—1	9 1 10
Income	102½	99	—	—	101	—	3 18 2
Canadian Marconi $1 ...	6/6	3/9	—	Nil	5/–	--	—
Globe Tel. & Tel. :							
Ord.	32/6	27/6	5½*	7½*	30/–	—	5 0 0
Pref.	27/6	23/9	6	6	26/3	—	4 11 5
Great Northern Tel. (£10)	42½	34/–	20	20	41	—	4 17 7
Marconi-Marine	30/6	21/6	10	7½	23/9	—	6 6 4
Oriental Telephone Ord. ...	59/3	2½	12*	12*	57/6	—	4 3 8
Radio Corpn.	8	4⅛	8	6	8½	—	—
Telephone Props	13/9	11/3	5	6	13/9	—	8 14 6
Telephone Rentals (5/–) ...	10/–	7/6	5	6	9/–	—	3 6 8
Western Union	34⅛	17	2½	—	31½	—	—
Traction and Transport.							
Anglo-Arg. Trams :							
First Pref.	11/–	2/6	Nil	Nil	3/9	—	—
4% Inc.	31	8	Nil	Nil	9	—	—
British Electric Traction :							
Def. Ord.	1060	675	5	5	925	—25	—
Pref. Ord.	175	150	8	8	165	—	4 17 0
Bristol Trams	45/–	34/3	5	8	38/9	—	4 2 9
Brazil Traction	14½	7½	70 cts.	$1	13½	+½	—
Calcutta Trams	26/9	21/6	8	8	23/–	—	6 19 2
Cape Elec. Trams ...	18/6	15/6	5	6	17/6	—	6 17 2
Lancs Transport	35/3	29/3	10	10	32/6	—	6 3 1
Mexican Light :							
1st Bonds	39	16½	5	5	20	—	—
Rio 5% Bonds	91	47	5	5	63	—	7 18 9
Southern Rly. :							
5% Prefd.	87	48	5	—	51½	—3	—
5% Pref.	116	83	5	5	94½	—	5 5 10
T. Tilling	60/–	36/6	10	10	43/9	—⅛	4 11 4
Tilling & B.A.	57/–	46/–	6	10	50/–	—	4 0 0
West Riding	46/3	30/6	10	10	32/6	—	—
Equipment and Manufacturing.							
Aron Electricity Ord. ...	40/3	31/–	15	15	1 1⅛	—	8 17 6
Assoc. Elec. :							
Ord.	45/3	32/–	10	10	37/6	—1/–	5 6 8
Pref.	38/9	35/6	8	8	36/–	—	4 9 0
Automatic Telephone & El.	43/–	35/–	5	10	41/3	—	4 17 1
Babcock & Wilcox ...	44/–	32/6	10	10	37/6	+⅛	5 6 8
British Aluminium Ord. ...	54/–	40/–	10	12½	50/–	—	4 17 6
British Insulated Ord. ...	95/9	77/–	20	20	4½	—	4 9 0
British Thermostat (5/–) ...	15/6	9/–	17½	18½	11/3	—	8 4 6
British Vacuum Cleaner...	35/9	27/6	5	6	30/–	—	4 0 0
Brush Ord....	5/6	4/9	Nil	Nil	5/–	—3d.	—
Callender's	5⅛	78/6	20	20	4 ⅛	—⅛	4 18 4
Chloride Elec. Storage ...	77/9	61/–	15	20	75/–	—	5 6 8
Consolidated Signal ...	116/–	75/–	30	36½	4½	—	8 2 0
Crabtree (10/–)	29/–	22/–	—	17½	23/3	—6d.	7 10 6
Crompton Parkinson :							
Ord. (5/–)	32/3	18/9	12½	12½	23/9	—⅛	—
E. K. Cole (5/–)	8/9	4/6	5	10	6/6	—6d.	7 13 10
Elec. & Musical Industries (10/–)	16/3	9/–	10	5	10/3	—9d.	4 19 0
Electric Construction ...	36/–	31/–	10	12½	32/6	—	7 13 10
Enfield Cable Ord. ...	5 ⅝	46/–	25	25	2½	—	—
Electrical Switchgear ...	26/3	22/6	5	5½	23/9	—⅛	4 12 5
English Electric	31/9	24/6	Nil	10	29/6	—	6 15 7
Ensign Lamps (5/–) ...	14/3	11 3	—	10	13/6	—	7 8 2
Ericsson Tel.	2⅜	31/–	25*	25*	2	—	3 2 6
Ever Ready (5/–)	26/3	16/6	45	35	19/–	+6d.	9 4 2
Falk Stadelmann	34/3	27/–	10	10	27/6	—	7 5 6
Ferranti Pref.	27/6	25/6	7	7	27/6	—	5 2 0
G.E.C. :							
Pref.	34/–	31/3	6½	6½	31/3	—	4 3 4
Ord.	79/3	67/–	17½	20	76/–	—1/6	5 5 3
Greenwood & Batley ...	25/6	19/–	7	15	22/6	—¼	13 6 8
Hall Telephone (10/–) ...	24/6	18/3	5	15	18/9	—	8 0 0
Henley's (5/–)	21/–	16/–	15	20	20/–	—	5 0 0
4½% Pref.	23/–	22/–	4½	4½	22/6	—	4 0 0
Hopkinsons	40/–	32/6	10	12½	37/–	—	6 15 2
India-Rubber Pref. ...	21/9	20/3	5½	5½	21/3	—	5 3 6
Intl. Combustion	5¼	4¼	5	30	5	—¼	6 0 0
Ismay Industries (5/–) ...	6/9	1/3	6	6	1/6	—	—
J. Lucas	57/9	47/6	15	15	55/–	—	5 9 1
Johnson & Phillips ...	43/9	32/6	10	12½	37/6	—	6 13 4
Lancashire Dynamo ...	72/3	53/–	20	25	55/–	—	9 4 0
Laurence Scott (5/–) ...	12/–	9/–	7	15	10/6	—	7 2 10
London Elec. Wire ...	35/–	28/3	12	7½	28/9	—	5 4 2
Mather & Platt	49/–	41/3	12	13½	44/6	—1/9	6 1 4
Metropolitan Elec. Cable Pf.	22/–	21/–	5½	5½	21/3	—	5 3 6
Murex	93/9	66/3	20	20	72/6	—⅛	5 10 6
Pye Deferred (5/–) ...	12/–	8/–	5	25	9/–	—6d.	13 17 10
Revo (10/–)	36/3	30/–	12	17½	33/9	+⅛	5 3 7
Reyrolle	62/6	49/–	12½	12½	56/3	—	4 9 0
Siemens Ord.	31/–	20/6	7½	7½	23/9	—	6 6 4
Strand Elec. (5/–)... ...	6/–	4/–	5	5	4/6	—	11 2 0
S. Smith (1/–)	9/9	6/3	37½	50	8/9	—	6 6 0
Switchgear & Cowans (5/–)	19/6	12/6	20	20	14/6	—6d.	6 18 0
Telegraph Condenser (10/–)	18/9	12/–	5	5	12/6	—	4 0 0
Telegraph Construction ...	2½	36/–	7½	10	2½	—	4 9 0
Telephone Mfg. (5/–) ...	9/9	7/–	9	9	8/9	—3d.	5 2 10
Tube Investments ...	89/6	70/–	23¾	23¾	4½	—	5 15 6
Vactric (5/–)	9 9	5/9	10	10	7/–	—	7 2 10
Vickers	27/–	17/6	10	10	21/6	—	4 13 0
Westinghouse Brake ...	63/9	45/–	15	17½	2⅜	—¼	6 13 4
Walsall Conduits (4/–) ...	26/–	22/6	6¼	55	23/3	–6d.	9 9 8
West, Allen (5/–)	5/9	4/6	—	7½	5/6	—	6 16 4

* Dividends are paid free of Income Tax.

New Patents

Electrical specifications recently published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1936

13475. "Radio and other carrier wave receivers." Marconi's Wireless Telegraph Co., Ltd., and E. W. B. Gill. March 23rd, 1937. (492646.)

33897. "Telephonic apparatus." E. Jontof Hutter. December 15th, 1936 (Cognate applications 10671/37 and 19862/37). (492368.)

34289. "Moving-contact electric current convertors." Siemens-Schuckertwerke Akt. Ges. December 13th, 1935 (Cognate applications 34290/36, 34291/36 and 34292/36). (492369.)

1937

4683. "Prepayment mechanisms particularly for use in connection with electric meters." British Sangamo Co., Ltd., F. R. Butherus and G. E. Weston. February 16th, 1937 (Cognate application 14989/37). (492649.)

4811. "Dimmers for electric lighting systems for theatres, cinemas, ballrooms, or other buildings in connection with which lighting of variable effect is required. Strand Electric and Engineering Co., Ltd., and R. A. McKenzie. February 17th, 1937. (Cognate application 1154/38.) (492650.)

5071. "Telecommunications system." W. G. H. Finch. February 26th, 1936. (492379.)

8198. "Seals for electric-discharge vessels. C. Lorenz Akt. Ges. March 20th, 1936. (492659.)

8217. "Television transmitting apparatus." E. E. Thomson and H. Miller. March 20th, 1937. (492442.)

8276. "Electric communication cables." Southern United Telephone Cables, Ltd., and C. G. Jackson. March 20th, 1937. (492382.)

8301. "Electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd. March 21st, 1936. (492604.)

8367. "High-frequency oscillators." General Electric Co., Ltd., and E. C. S. Megaw. March 22nd, 1937. (492610.)

8390. "Electric-discharge devices." British Thomson-Houston Co., Ltd. March 21st, 1936. (492385.)

8410. "Anode material for anodic incandescent lamps, and method of producing same. Albiswerk Zurich Akt. Ges. March 20th, 1936. (492712.)

8478. "Television or like systems." Baird Television, Ltd., and V. A. Jones. March 23rd, 1937 (addition to 470785). (492662.)

8515. "Television or like systems." Baird Television, Ltd., and L. R. Merdler. March 23rd, 1937. (492665.)

8666. "Arc-rupturing devices for electric switches." E. Lange. March 24th, 1937 (addition to 455115). (Convention date not granted.) (492721.)

8784. "Dynamo-electric machines." Eclipse Aviation Corporation. March 26th, 1936. (492682.)

8817. "Electrolytic cell for the production of caustic alkalis and chlorine." I. G. Farbenindustrie Akt. Ges. July 4th, 1936. (492688.)

8891. "Railway signalling systems." Standard Telephones & Cables, Ltd., and A. Brown. March 25th, 1937. (492694.)

8924. "Method of voltage or current amplification utilising electron multipliers." G. Weiss. May 31, 1936. (492698.)

9803. "Metal-clad electrical switchgear." D. R. Davies, and Metropolitan-Vickers Electrical Co. April 6th, 1937. (492395.)

10367. "Directional wireless receiving systems." Rediffusion, Ltd., and S. H. Grove. April 12th, 1937. (492455.)

10769. "Electric cable." Southern United Telephone Cables, Ltd., W. P. Whitehouse and A. T. C. Moore. April 15th, 1937. (492397.)

11784. "Radio receivers." Ferranti, Ltd., and M. Tomlin. April 24th, 1937. (492398.)

12755. "Signal apparatus of the searchlight type." Westinghouse Brake & Signal Co., Ltd. July 9th, 1936. (492402.)

12756. "Electric signalling and like apparatus." Westinghouse Brake & Signal Co., Ltd. June 10th, 1936. (492403.)

12757. "Light signals." Westinghouse Brake & Signal Co., Ltd. July 3rd, 1936. (492404.)

16168. "Electric amplifiers." General Electric Co., Ltd., and A. J. Biggs. June 10th, 1937. (Cognate application 16897/37.) (492407.)

16170. "Automatic tuning of wireless receiving apparatus." General Electric Co., Ltd., and L. C. Stenning. June 10th, 1937. (492408.)

16308. "Electric radiators." Limit Engineering Co., Ltd., and A. L. Collins. June 11th, 1937. (492546.)

16578. "Rotors for dynamo-electric machines." General Motors Corpn. June 15th, 1936. (492470.)

18757. "Electric follow-up control systems." Soc. Anon. Hewittic and M. Demontvignier. July 9th, 1936. (492414.)

19292. "Electric heaters." R. Haddan (Moffats, Ltd.). July 12th, 1937. (492478.)

20080. "Apparatus for making measurements on multi-channel carrier telephony systems." General Electric Co., Ltd., L. I. Farren and E. P. L. Westell. July 20th, 1937. (492550.)

20102. "Production of vacuum vessels, in particular of electrical discharge vessels." Siemens & Halske Akt.-Ges. July 24th, 1936. (492480.)

21531. "Electric lamps." Birdseye Electric Corpn. August 7th, 1936. (492554.)

24721. "Insulation for electrical apparatus." Standard Telephones & Cables, Ltd. (Western Electric Co.). September 10th, 1937. (492420.)

25036. "Stabilising arrangement for oscillators in high-frequency apparatus for signal transmission." E. K. Cole, Ltd. May 15th, 1937. (492624.)

26243. "Electric vaporisers." A. H. Stevens (American Sundries Co. Inc.). September 28th, 1937. (492422.)

26335. "Electrically operated indicators." J. Handley C. Suckling and R. H. Suckling. September 29th, 1937. (492562.)

26500. "Directional lighting fittings." General Electric Co., Ltd., and J. B. S. Smyth. September 30th, 1937. (492626.)

26981. "Electric gas-blast switches." Maschinenfabrik Oerlikon. October 8th, 1936. (492424.)

28558. "Electrical ignition systems." General Motors Corpn. October 21st, 1936. (Addition to 427679 and 458592.) (492484.)

30016. "Devices for tilting high-frequency furnaces." Siemens & Halske Akt. Ges. March 16th, 1937. (492564.)

31386. "Electric circuit-breaker having arc-extinguishing arrangements." Allmanna Svenska Elektriska Aktiebolaget. November 14th, 1936. (Cognate applications 31387/37 and 31388/37.) (492486.)

31392. "Call system for telephonic line with multiple stations." Soc. Anon. des Ateliers Brillie Freres. November 14th, 1936. (Cognate application 31393/37.) (492487.)

32968. "Alternating-current switching devices." Siemens-Schuckertwerke Akt.-Ges. November 28th, 1936. (492429.)

34261. "Electric resistances or resistors." Standard Telephones & Cables, Ltd. December 24th, 1936. (492431.)

34576. "Machines for applying spacing washers to the central conductor of a concentric cable." Standard Telephones & Cables, Ltd., D. Nunn and W. C. Slade. December 14th, 1937. (Addition to 458772.) (492572.)

1938

723. "Synchronisation apparatus for television." Radioakt. Ges. D. S. Loewe. January 9th, 1937. (492495.)

2049. "Superheterodyne receiving apparatus." Fabrica Italiana Magneti Marelli. January 22nd, 1937. (492635.)

4169. "Apparatus for magnetically testing materials according to the direct current impulse method." Ges. zur Forderung Zerstorungsfrerier Prufuerfahren e V. May 4th, 1937. (492501.)

5431. "Electrical measuring instruments." Hartmann & Braun Akt.-Ges. February 26th, 1937. (492710.)

5838. "Casings, more particularly for electric motors." R. Bosch Ges. February 26th, 1937. (492434.)

6852. "Shielding arrangements for high-frequency thermionic tube devices." C. Lorenz Akt. Ges. March 6th, 1937. (492641.)

10729. "Direction-finding radio receiver systems." Telefunken Ges. für Drahtlose Telegraphie. April 7th, 1937. (492643.)

13458. "Automatic telephone systems." Standard Telephones & Cables, Ltd. May 6th, 1937. (492514.)

16299. "Electric motors." British Thomson-Houston Co., Ltd. July 22nd, 1936. (Divided out of 490708.) (492644.)

25973. "Telephonic and like apparatus." E. Jontof Hutter. December 15th, 1936. (Divided out of 492368.) (Cognate applications 21070/37 and 25974/38.) (492436.)

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from October 12th.

Thuroid. No. 586993. Class 50 (III). Plastic mouldable compositions having a basis of cellulose acetate, and articles made therefrom.—Thurgas Bollé, Ltd., Harbo Works, Mount Pleasant, Alperton, Middlesex.

Aerod, No. 600329; also Skyrod, No. 600330. Class 9 (IV). Aerials for wireless telegraphy and telephony. Belling & Lee, Ltd., 540, Cambridge Arterial Road, Enfield, Middlesex.

Compensation Sought from Wrong Parties

IN the King's Bench Division on October 14th Lord Justice Goddard dismissed an action brought by Mrs. R. M. Harris, of Alperton, Middlesex, on behalf of herself and her two infant children, to recover damages for the death of her husband, Mr. O. L. Harris, an electric welder, who at the time of his death was in the employ of Messrs. James Howden & Co. (Land), Ltd. Mr. Harris was killed in January, 1937, when he fell 90 ft. through a loose grating at Fulham Power Station then in course of construction.

The defendants joined in the claim, which was based on alleged negligence, were Dorman, Long & Co., Ltd., the main steelwork contractors, Allen Kennedy & Co., Ltd., who supplied and attached the gratings and grids, and James Howden & Co., also sub-contractors. These defendants were joined as third parties. All the defendants denied liability and negligence.

In giving judgment, his Lordship, in dismissing the action with costs, said that Harris's death was caused in circumstances which certainly gave his widow a cause of action against somebody, but unfortunately she had not sued the one party who might have been liable—Fulham Borough Council. The accident, he said, was due to a panel of steel flooring being removed and not properly replaced. Nobody knew who actually laid the "trap," but it appeared that at the time the Council was in charge of the floor. There was no negligence on the part of any of the defendants, and if an action were now brought against the Council it could successfully plead the Public Authorities Protection Act as the action had not been instituted within six months of the accident. If the plaintiff had established liability he would have assessed her damages at £2,500.

An application on behalf of Mrs. Harris to fix compensation under the provisions of the Workmen's Compensation Acts was postponed until to-day (Friday).

Contract Information

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Argyll.—October 24th. County Council. Electric lighting installation at Ardrishaig housing estate. County architect, Education Offices, Dunoon.

Australia.—MELBOURNE.—November 2nd. Victorian Railway Commissioners. Electric winder and accessories for the new Kirrak Colliery, Wonthaggi. (T.Y. 27281/38.)*

October 31st. City Council. Five low-voltage air-break circuit-breakers. (T.Y. 27157/38.)*

BRISBANE.—December 12th. City Electric Light Co., Ltd. One 25,000-kW turbo-alternator and accessories. (T.Y. 26867/38.)*

November 18th. Tramways and Power House Department. Sets of 11-kV, three-phase, 50-cycle switchgear. (T.Y. 27518/1938.)*

VICTORIA.—November 22nd. State Electricity Commission. Two 20,000-kVA, three-phase transformers. (T. 27406/38.)*

Bedford.—November 18th. Electricity Department. Meters, waterheaters, cookers, cooker control units, kettles, meter boards and house service fuses for twelve months. (See this issue.)

Blackpool.—October 31st. Electricity Department. 6,600-V, three-phase metal-clad switchgear, and 6,600-V, three-phase transformers. (October 14th.)

Cardiff.—November 14th. Electricity Department. 40-W and 60-W gas-filled lamps. (October 14th.)

Darlington.—October 22nd. Electricity Department. Wiring installations in Council houses. (October 7th.)

Edinburgh.—October 24th. Scottish Special Areas Housing Association, Ltd. Electric lighting installation at Crofthead estate, West Lothian (ninety-eight houses). Secretary, 73a, Shandwick Place.

Farnworth.—October 25th. Electricity Department. One 1,000-kVA transformer and wiring cables. (October 7th.)

Greenock.—October 24th. Town Council. Electric lighting installations in eighty-seven houses. Director of Housing, Municipal Buildings.

Halifax.—November 14th. Housing Committee. Electrical installation work at the Backhold Lane and Nursery Lane estates. Town Clerk, Town Hall (deposit £2 2s.).

Leslie (Fife).—October 24th. Town Council. Electric lighting of Paterson Park housing estate. Town Clerk (deposit £1 1s.).

Hastings.—November 2nd. Electricity Department. Galvanised steelwork for overhead lines, creosoted red fir poles, stay blocks and single-phase and three-phase, indoor and outdoor transformers for twelve months. (October 14th.)

Herefordshire.—County Council. Electric lighting and power, electric clocks, call bells, fire alarms, emergency lighting and lifts for the proposed new hospital and adaptations at the existing public assistance institution. (See this issue.)

India.—SIMLA.—October 22nd. Indian Stores Department. 1,100-yd. of p.i., l.c., s.w.a., 660-V cable and indoor and outdoor type dividing boxes. (T. 27501/1938.)*

Inverness.—October 25th. Town Council. Electric lighting work at Dalneigh and Glenurquart Road housing estates (100 houses). Town Clerk.

London.—HAMMERSMITH.—October 26th. Electricity Department. Two 500-kVA oil-immersed transformers. (October 14th.)

HORNSEY.—October 29th. Electricity Department. DC and AC electricity meters, maximum demand indicators, DC and AC fixed charge collectors and time switches. (October 14th.)

Manchester.—October 28th. Electricity Committee. AC electric fan motors and three-phase 400/230-V switchgear for twelve months. (October 14th.)

October 31st. Electricity Department. One emergency control board for 6.6-kV switchgear. (See this issue.)

Newton-in-Makerfield.—November 11th. Electricity Department. Two 400-kVA transformers and one 11-kV switchboard. (See this issue.)

New Zealand.—WELLINGTON.—January 24th, 1939. Public Works Department. Seven 7,400-kVA single-phase transformers complete with accessories. (T.Y. 27512/38.)*

February 14th, 1939. Two 22,200-kVA generators and two 28,000-HP turbines. (T.Y. 27513/38.)*

January 9th, 1939. Post and Telegraphs Department. Two motor-generator sets. (T.Y. 27818/1938.)*

CHRISTCHURCH.—November 10th. Electricity Department. Two voltage regulators. (T. 27502/1938.)*

Northumberland.—County Council. Electrical installation at the Berwick High School for Girls. W. W. Tasker, architect, County Hall, Newcastle-on-Tyne.

Peterborough.—November 7th. Town Council. Three sets of Diesel oil engines driving centrifugal pumps, together with appurtenant works, for Wilsthorpe waterworks pumping station. City engineer, Town Hall (deposit £3 3s.).

St. Helens.—November 11th. Electricity Department. High- and low-voltage p.i. cables. Salt glazed stoneware ducts and cable protection tiles. (See this issue.)

South Africa.—PORT ELIZABETH.—November 10th. 22,000-V, 0.15 sq. in., three-core cable and accessories. (T.Y. 27462/38.)*

JOHANNESBURG.—November 12th. City Council. One 750-kW automatic rotary convertor. (T.Y. 27731/38.)*

CAPE TOWN.—November 2nd. Electricity Department. One 500-kVA three-phase transformer and two three-phase current limiting reactors. (T.Y. 27757/1938.)*

November 24th. Overhead line material. (T. 27775/1938.)* Combine insulated copper wire. (T.Y. 27776/38.)*

October 31st. 110-V, 230-V and 240-V electric lamps. (T. 27773/38.)*

Southampton.—November 22nd. Electricity Department. One 15-ton electric trolley locomotive for the generating station, Western Esplanade. (See this issue.)

Sunderland.—Town Council. Electrical installation at the nurses' hostel at the Municipal Hospital. J. E. Lewis, borough engineer.

Uruguay.—MONTEVIDEO.—November 17th. Electricity Supply and Telephones Administration. 20,000 metres of twin v.i.r. cable. (T.Y. 27835/1938.)*

November 18th. 400,000 metres of lead-covered cable. (T.Y. 27836/1938.)*

November 21st. 400,000 metres of twin v.i.r. cable. (T.Y. 27837/38.)*

Walsall.—October 24th. Electric Supply Department. Materials and apparatus for twelve months. (October 7th.)

Stafford.—November 3rd. Town Council. Two electrically driven direct-coupled vertical spindle centrifugal multi-stage well and booster pumps, and all other works in connection therewith. W. Plant, borough engineer, Borough Hall (deposit £5 5s.).

Worthing.—October 25th. Water Department. One vertical spindle bore-hole centrifugal type pump and electric motor, with all necessary accessories, for the Broadwater pumping station. Town Clerk, Town Hall (deposit £2).

Orders Placed

Blackpool.—Education Committee. Accepted. Electrical wiring for cinema at technical college.—R. Darbyshire.

Electricity Committee. Accepted. Fire protective equipment for power station.—Mather & Platt.

Dartford.—Electricity Committee. Accepted. Cable (£358).—Britannic Electric Cable & Construction Co.

Hampton.—Metropolitan Water Board. Recommended. Two sub-switchboards (£598).—G.E.C. Two circuit-breaker cubicles and instruments (£606).—Watford Electric & Mfg. Co.

Hyde.—Sewage Committee. Accepted. Electrical installation at sewage works.—Johnson & Turner.

Lichfield.—Electricity Committee. Accepted. Switchgear (£325).—Electric Construction Co.

London.—L.C.C.—Accepted. Wiring and fittings at L.C.C. schools: Berkshire Road (£1,315).—Atozed. Fulham Central (£828) and John Harvard (£846).—Newman & Watson. Old Oak (£1,315).—E. C. Sparkes & Co., Sumner Road (£1,037).—H. J. Cash & Co.

Wiring and fittings for electric lighting, &c., in block of dwellings on the Springfield estate, Wandsworth.

	£		£
Holliday & Son (Electrical). Accepted	**4,987**	W. H. Gaze & Sons	6,443
Archibald Meckhonik	5,107	Francis Polden & Co.	6,455
Pinching and Walton	5,187	A. Hawkins & Sons	6,955
W. J. Furse & Co. (London)	5,368	G. E. Taylor & Co.	7,107
Samuel Reed & Sons	6,133	Newman and Watson	7,818

Wiring and fittings for electric lighting, &c., in a block of dwellings on the Will Crooks estate, Poplar.

	£		£
Holliday & Son (Electrical). Accepted	**998**	Buchanan and Curwen	1,198
Archibald Meckhonik	1,111	Anderson, Angell & Co.	1,204
Jacob, White & Co.	1,159	A. J. Hewens & Sons	1,326
Pinching and Walton	1,160	Ilford Electrical Co.	1,432
Springvale Electrical Co.	1,195	G. Hopkins & Sons	1,506

Wiring and fittings for public lighting on the Bourne estate, Holborn:

	£		£
Newman and Watson. Accepted	**532**	Samuel Reed & Sons	838
City Electrical Co.	627	Archibald Meckhonik	922
Ryland's Electrical Co.	679	W. Shipp & Son	957
County of London Electric Supply Co.	777	G. A. Weston	971
Jacob, White & Co.	794	Burdette & Co.	1,252

Wiring and fittings for electric lighting, &c., in one block of flats in the Dufferin Street dwellings, Finsbury:

	£		£
Ryland's Electrical Co. Accepted	**312**	Jacob, White & Co.	433
Newman and Watson	326	Archibald Meckhonik	444
County of London Electric Supply Co.	418		

Wiring and fittings for electric lighting, &c., in blocks of dwellings on the Tulse Hill estate, Lambeth:

	£		£
Holliday & Son (Electrical). Accepted	**6,021**	Electrical Installations	6,841
Archibald Meckhonik	6,189	Samuel Reed & Sons	6,985
Coleby & Co.	6,486	City Electrical Co.	6,990
F. H. Wheeler & Co.	6,618	Newman and Watson	8,041
Read & Partners	6,738	Alexander Hawkins & Sons	8,787
		Atozed (London)	9,417

Installation of electrical switch socket outlet points in thirteen blocks of flats on the East Hill estate, Wandsworth:

	£		£
Holliday & Son (Electrical). Accepted	**1,357**	Jacob, White & Co.	1,568
Newman and Watson	1,486	Springvale Electrical Co.	1,585
Archibald Meckhonik	1,494	Electrical Installations	1,634
Ryland's Electrical Co.	1,507	City Electrical Co.	1,883
		Alexander Hawkins & Sons	2,156

Provision and erection of two electric lifts in the anti-toxin establishment, Carshalton, Surrey:

	£		£
Gimson & Co. (Leicester).		Marryatt and Scott	1,856
Accepted	**1,690**	Pickerings...	1,860
Evans Lifts	1,700	Keighley Lifts	1,930
Etchells, Congdon and Muir ...	1,720	Aldous and Campbell	1,980
Elliston, Evans and Jackson ...	1,770	Express Lift Co.	2,158
Bennie Lifts	1,840	Waygood-Otis	2,274

Redcar.—Electricity Committee. Accepted. Feeder cable (£483).—Enfield Cable Works.

Stockton-on-Tees.—Town Council. Accepted. Electrical installation at a new girls' school at Junction Road (£580).—W. Stewart. One 300-kVA transformer (£215).—British Electric Transformer Co.

Warrington.—Health Committee. Accepted. Electric bed lift at Whitecross institution—Etchells, Congdon & Muir.

Electricity Committee. Accepted. Cables.—B.I. Cables. Earthenware conduits.—Albion Clay Co. Concrete slabs, tiles and service box covers.—S. H. Bonsall.

West Hartlepool.—Committee of Management. Accepted. Electrical installation at the extensions of the Cameron Hospital.—E. Phillips.

Work in Prospect

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Cinema, Woodside, for Astoria Cinema Co.; J. R. Donald, chairman of directors, Aberdeen.

Accrington.—Houses (20), Heaning Avenue; J. W. Hodgson.

Ashbourne.—Houses (58), Clifton estate; U.D.C. surveyor.

Audenshaw.—Houses (38), Shepley Road; Urban Development Co., Spring Gardens, Westminster, London, S.W.1.

Barnsley.—Houses (24), Cliffe estate; C. D. Potter & Sons, Ltd. Houses (20), Porter Terrace; H. Porter.

Bedworth.—Houses (48), Wooton Street; J. Daniels, builders, Anstey Road, Coventry.

Birmingham.—Houses (47), Kettlehouse estate; Henry Boot & Son, Ltd. Houses (20), Moat Lane, Yardley; H. Dare & Son, builders, Washwood Heath Road, Birmingham. Houses (68), Oscott estate; G. Stubbings. Aeroplane works, 130 acres, Tyburn; Morris Motors, Ltd. Blocks of houses, Rednal Road, King's Norton; E. L. Howell, contractors, Watford Road, King's Norton. Factory, Lea Hall estate, for James Booth (1915), Ltd.; Buckland and Haywood, Norwich Union Chambers, Congreve Street. Factory and office building, Brearley Street; Maddocks & Walford, builders, Tyburn Road. Police garage and air raid shelter (£11,616); city engineer. Extensions to premises, for Worlds Wear, Ltd., Sampson Road North; Smith Bros. (Construction), Ltd., 263-5, Stratford Road.

Blackpool.—Houses (42), All Hallows Road; T. Smith. Houses (16), Highfield Road; Breadshaw & Co. Showrooms and offices, Collingwood Avenue; C. H. MacKeith. Theatre at the entrance to North Pier, for Blackpool Pier Co.

Blyth.—Thomas Knight Memorial Hospital (£50,000); Newcombe and Newcombe, architects, 23, Eldon Square, Newcastle-on-Tyne.

Bournemouth.—Bathing station, West Promenade (£11,600); borough engineer.

Bradford.—School, Haycliffe Lane, for the E.C.

Brandon.—Houses, Brandon Colliery; U.D.C. surveyor.

Bromsgrove.—Houses (44), Alvechurch, Stoke Prior, Wythall site, Pinchers Clowe, Belbroughton and Fairfield, for the R.D.C.; J. A. Folkes, architect, 34, Hagley Road, Stourbridge.

Burton Latimer (NORTHAMPTONSHIRE).—Extensions to factories, for Weetabix, Ltd.

Cardiff.—Factory, Treforest Trading estate, for Flex Fasteners, Ltd.; Sir Alexander Gibb and Partners, Queen Anne's Lodge, London, S.W.1.

Castleford.—Additions to the Castleford and District Hospital; Easdale & Son, architects, County Chambers.

Chester-le-Street.—Houses, Sacristan and Bourmoor; R.D.C. surveyor.

Chingford.—Houses (62), Mansfield estate; U.D.C. surveyor.

Coventry.—Offices, Broad Street; J. G. Gray, builders, Broad Street.

Dartford.—Houses (106), near Darenth Road; P. C. Brazier.

Denton.—Houses (20), Granada Road; J. Riley & Sons, builders, 59, Forge Lane.

Dewsbury.—Baths; borough engineer.

Doncaster.—Buildings, Printing Office Street, for the Doncaster Co-operative Society, Ltd.; Johnson & Sons, architects. Priory Place.

Dorset.—School, Gillingham; county architect, "Hollybank," Acland Road, Dorchester.

Douglas (I.O.M.).—Houses, St. Catherine Drive; Ideal Homes, Ltd.

Dudley.—Houses (16), Bull Ring area; borough engineer.

Durham.—Houses (28), Framwellgate, for the City Council; city engineer.

Earswick (YORKSHIRE).—School, for the Joseph Rowntree Trust; R. B. Hall, architect, 24, William Way, Letchworth, Hertfordshire.

Edinburgh.—Houses (382), West Pilton, for city architect.

Elland.—Houses (30), Exley Lane; T. Aspinall, Exley Lane estate.

Eston (YORKSHIRE).—School (£45,000); J. White, architect, County Hall, Northallerton.

Glasgow.—Houses, Largie Road; Lawrence Building Co., Ltd.

Gloucester.—Aircraft factory, Brockworth (£1,000,000), for Air Ministry.

Grantham.—Houses (90), Cherry Orchard estate; borough engineer.

Hebburn-on-Tyne.—Houses, Langley Villas Road; J. M. Black, Ltd., builder, Grange Road West, Jarrow-on-Tyne.

Hereford.—Development of Putson estate; J. Hiles & Son.

Houghton-le-Spring (Co. DURHAM).—Bus station; V. Hunter, surveyor and architect, Council Offices.

Hyde.—Houses (14), Gloucester Road; F. Norgrove & Son.

Jarrow-on-Tyne.—Chemistry and optical departments and extensions to bakery, for the Jarrow and Hebburn Co-operative Society; G. C. Young, architect, 12, Grange Road West.

Lancashire.—School, Whiston, near Prescot, for the E.C.; D. A. Ablett & Sons (1938), Ltd., contractors, Sovereign Road Saw Mills, Wigan.

Lancaster.—Premises, Hare Runs estate, for the Lancaster Co-operative Society, Ltd., 51, Church Street.

Leeds.—Flats, Falkland Grove, Chapel Allerton; C. H. & F. Lax. Shops and houses, estate near Henconner Lane; F. Rawnsley.

Leicester.—Extensions to Charnwood Street schools (£23,000), for the E.C.; H. H. Hind, 3, Greyfriars.

Lichfield.—Houses (26), Sytchbrook Gardens; J. Hudson. Extensions to Victoria Hospital; governors.

Liverpool.—Buildings, Parkside Hospital, Derby Road, Huyton, for the Board of Management; John Lucas & Son (Builders), Ltd., contractors, 36, Eccleston Street, Prescot. Factory, Edwards Lane, Speke, for Tools, Gigs & Moulds, Ltd. (a new company). Factory and offices, Speke Hall Road, for James Austin, Ltd., 32, Great George Square.

London.—(CAMBERWELL).—Reconstruction of premises, 129, Camberwell Road; A. W. Cooksey & Partners, 6, Adams Street, W.C.2.

Malton.—Houses (56), Park Grove, Norton, near Malton; G. T. Potts, builder, Thornton Road, Pickering.

Manchester.—Extensions to five schools; R.C. trustees. Rebuilding premises, Pendleton, for Martins Bank, Ltd.; Walton & Co., builders, Salford.

Margate.—Houses (58,) Garlinge; Operative Builders and Decorators, Ltd., Birchington.

Middlesbrough.—Houses (20), Belmont Avenue; H. Garbutt, architect, Albert Road.

Midlothian.—Houses (56), Polbeth, West Calder, for Scottish Special Areas Housing Association; Carr and Howard, architects, 30, Rutland Square, Edinburgh.

Murton.—Cinema, for the Knaresborough Cinema Co.; G. M. Hall, director, Church Bank.

Newburn-on-Tyne.—Houses (12), East Denton estate; Hetherington and Wilson, architects, County Chambers, Westgate Road, Newcastle-on-Tyne.

Newcastle-on-Tyne.—College and hostel (£76,000), for the Northern Counties College of Cookery and Domestic Science.

Northumberland.—Hall and offices, &c., Shaftoe Trust school, Haydon Bridge; Hetherington & Wilson, architects, Westgate Road, Newcastle-on-Tyne.

Portsmouth.—Factory, for R. K. Dundas, Ltd. Fire and police headquarters, Greetham Street; city engineer.

Sheffield.—Block of flats and garages, Bosville Road, Crookes; G. Jackson & Sons, contractors, 112, Lydgate Lane, Broomhill. Works, for A. H. Gregory, Sussex Street.

South Shields.—Houses (2,000); J. Reid, borough engineer and architect. Rebuilding of tailoring, outfitting and drapery departments, for the Jarrow and Hebburn Co-operative Society; C.W.S. Building Dept., West Blanford Street, Newcastle-on-Tyne.

Spalding.—Houses (24), Pinchbeck; G. Campion, builders, Dogsthorpe Road.

Stockton-on-Tees.—Houses (80); Kendrews, Ltd., builders, Norton House estate, Stockton-on-Tees.

Stoke-on-Trent.—School, Meir (£65,204), for the E.C.

Stourbridge.—Houses (88), Birmingham Street; Arthur M. Griffiths & Son, builders, Thomas Street, Wolverhampton.

Stourport.—Houses, Walshes Farm site, for the U.D.C.; Pritchard, Godwin & Clist, architects, Bank Buildings, Kidderminster.

Stretford.—Public library, King Street (£17,600), for the Libraries Committee; P. Howard, 88, Mosley Street, Manchester.

Sunderland.—School (1,280 places), for the E.C.; education architect, John Street.

Urmston.—Houses (21), Lostock Road and Westminster Road, Davyhulme; A. Locke, Ltd., Lostock Road. Houses (40), Urmston Hall Farm; M. Whittaker & Co., Ltd., Queen's Road.

Walthamstow.—Library, Wood Street (£28,235); borough engineer.

Wellingborough.—Extensions to works, London Road, for Almarco Metal Windows, Ltd.

Wembley.—Fire station (£24,014); borough engineer.

West Hartlepool.—Houses, East View Terrace; Potter and Monaghan, builders, Burn Road. Houses (46), near Elmwood Road; Watt Brothers, builders, 210, Park Road. Houses, Tees Road, for the Eldon Estates; J. J. Dobson, architect, 1, Scarborough Street.

West Lothian.—Houses (200), West Lothian, for Scottish Special Areas Housing Association, Ltd.; Thomas Roberts and Son, architects, 22, George Street, Bathgate.

Wigan.—Houses (258); J. Dove, borough surveyor.

Wolsingham.—Houses (20); North-Eastern Housing Association, Northumberland Road, Newcastle-on-Tyne.